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East Europe Report

SCIENCE & TECHNOLOGY

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EAST EUROPE REPORT

SCIENCE & TECHNOLOGY

CONTENTS

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COMPUTER TECHNOLOGY DEVELOPMENTS IN CSSR

Industry, Education's Joint Research

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 4, 1983 p 150

[Text] Joint R & D work stations help the most to achieve savings. They include, among others, the Electrotechnical Faculty of the CVUT [Czech Institute of Technology], the CKD [Ceskomoravska-Kolben-Danek] Semiconductor Plant, Tesla of Hradec Kralove, and the Tesla A. S. Popov Communication Engineering Research Institute in Prague. They are solving jointly the cardinal problem of today: how to accelerate the research, development and production of microelectronic components. Likewise exemplary is the joint socialist pledge that the Tesla Investment Electronics VHJ [Economic Production Unit] signed with the Electrotechnical Faculty of the CVUT, the Research Institute of Mathematical Machines, the Mathematics and Physics Faculty of UK [Charles University], the Research Institute of Engineering Technology, and the Development Shops of the CSAV [Czechoslovak Academy of Sciences]. The partners are helping to reduce the labor intensity at this VHJ. Reduction of the labor intensity has already reached 5.0 million standard man-hours in one year, while savings of materials have exceeded 22 million korunas.

Cooperation among the Cakovice plant of the ZPA [Industrial Automation Works], the Electrotechnical Faculty of the CVUT, and the Research Institute of Mathematical Machines has led to the design and production of an automatic system for measuring the values of electrical rotating machines. At the latest International Engineering Fair in Brno, the system was awarded a gold medal.

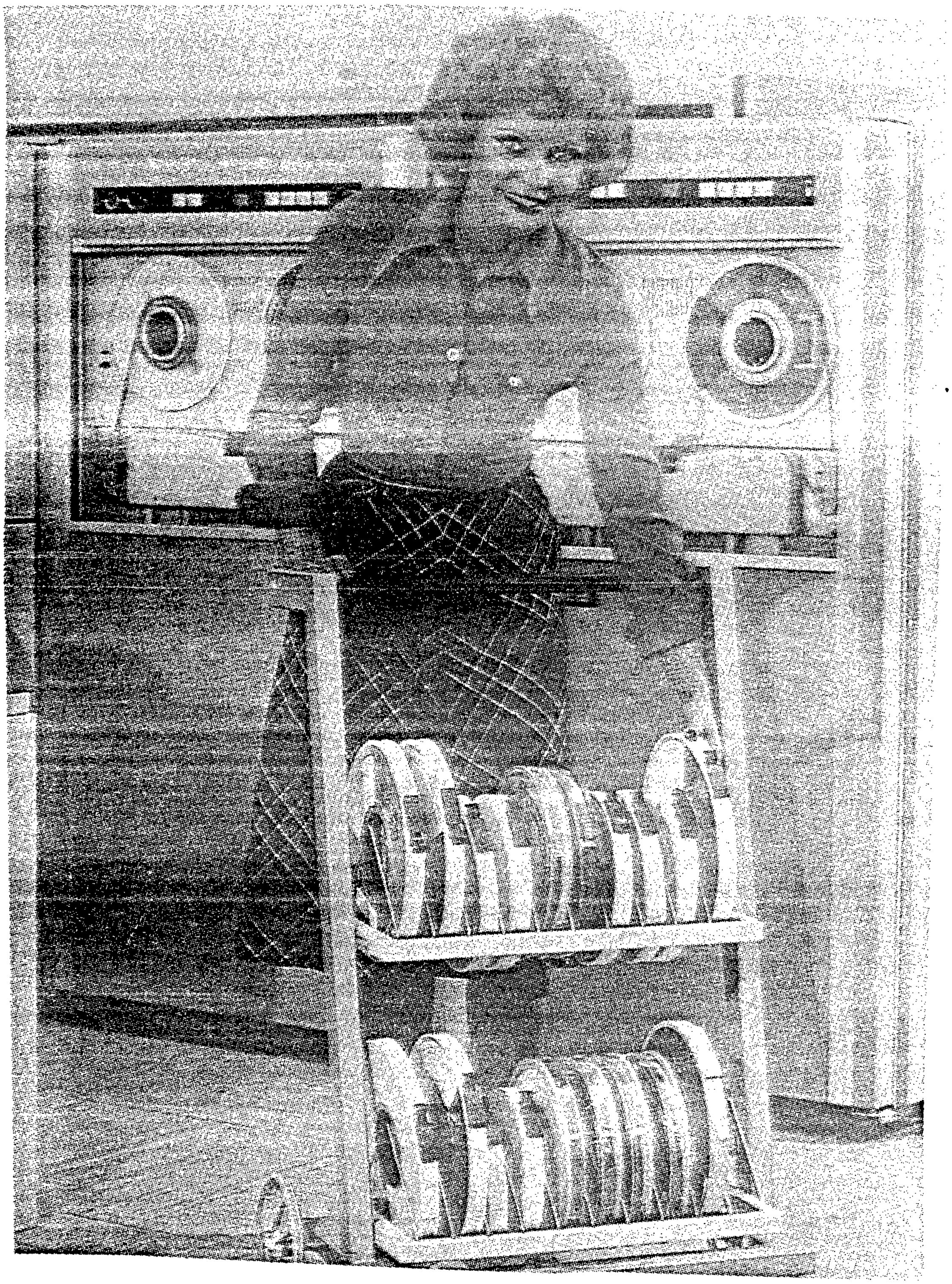
CSSR, USSR Swap Hardware

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 4, 1983 p 150

[Text] Computer hardware worth about 48 million rubles will be exchanged by Czechoslovakia and the Soviet Union in 1983. The contract for these deliveries was concluded by Czehoslovakia's Kovo Foreign-Trade Enterprise and the Soviet foreign-trade organization Elektronorgtekhnika. The Soviet Union will export EC 1045 computers. Czechoslovakia in turn will export computer peripherals.

Computer-Tape Cart

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 4, 1983, front cover photo



[Text] A cart to transport computer tape is certainly nothing new. Different forms and versions of such a cart can be found, attesting to the ingenuity of the designers.

R-COBOL Compiler

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 4, 1983 pp 150-155

[Article by Richard Cestr: "COBOL JSEP Compiler for Tesla Computers"]

[Excerpt] 4. Conclusion

The R-COBOL compiler has been in use since September 1981, at many of the enterprises that have Tesla computers. Discounting the minor bugs in the compiler that were immediately corrected, the experience with its use to date has been favorable. Users praise the compiler's speed, and the feasibility of controlling all disk organizations. Some enterprises that have both a Tesla and a JSEP [Unified System of Electronic Computers] computer make use of the ability to transmit programs between them. Here again R-COBOL has fulfilled all expectations.

Readers interested in the R-COBOL system may turn directly to the author of this article, preferably in writing. Telephone inquiries are possible by calling Prague telephone numbers 24-10-41 through 46 or 24-12-41 trhrough 45, extension 555.

The R-COBOL compiler has been submitted as an innovation proposal. If the compiler is accepted, the transfer will comprise the compiler's latest version, the latest version of the BAR LIBRARY 3 subroutines, the manual [1], and information about the compiler's newest version. Complaints may be made regarding possible bugs, which will then be corrected. In other words, work on the R-COBOL system is still continuing.

The manual supplied with the R-COBOL system is interesting in yet another respect. As a supplement, it contains a table summarizing the capabilities of COBOL and R-COBOL in the individual JSEP systems and Tesla computers. In this way every user is informed of what he may use, in view of the computer with which he will eventually replace his Tesla computer.

Users exerted pressure to have the R-COBOL system include also a COBOL library that is compatible with the Tesla COBOL library. Our original intention had been not to provide such a library, but to let each user maintain and correct his source programs by means of PROGLIB that runs all types of source programs uniformly. But we were overruled and had to begin also this function. The COBOL library has been written as a separate RCOBOLIBR program that supports all functions of the COBOL library, including the COPY function and even something more. The mechanism of the statements for correcting the source program has been modified; in the opinion of all users, this has improved and simplified execution. The improved version of the RCOBOLIBR program even calls the R-COBOL compiler and transfers the necessary parameters to it, so that to the user this seems to be a single program.

In conclusion I would like to take this opportunity to thank the Tesla Concern Enterprise of Karlin, where most of the compiler was debugged, and also my assistants who directly contributed to the R-COBOL system.

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TEMS 8000-PAS Microprocessor System

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 8, 1982 pp 310-314

[Article by Engineer Ivan Bicik and Engineer Karel Spacil, Tesla Electronic Circuits and Components Sectoral Enterprise's Institute of Microelectronic Applications, Brno: "The TEMS 8000-PAS Modular Microprocesor System and Its Use in Microprocessor Applications"]

[Text] Summary: The development of application software and the circuit design of microelectronic systems are discussed. A modular microprocessor system has been developed that is based on the 8080A microprocessor. The article acquaints the reader with this system.

It is unnecessary at present to emphasize the importance of microelectronics for the economy's development. The news media inform us daily of this field's penetration into practically every area of our life. The Tesla Electronic Circuits and Components Sectoral Enterprise's Institute of Microelectronic Applications (Tesla Eltos-IMA) is concerned with the development of application software and the design of circuitry for microelectronic systems. To test the applications of microprocessors and other support circuits in control and management systems, an R & D group at the IMA work station in Brno developed within a very short time a modular microprocessor system based on the 8080A microprocessor that is anticipated in Czechoslovakia. We wish to acquaint the journal's readers with this modular system, designated as the TEMS 8000-PAS (prumyslova aplikacni stavebnice; modular system for industrial applications).

1. Concept of the Designed Equipment

The designing of equipment with microprocessors is proceeding in two directions. For simple applications, single-board microcomputers have been developed. On a single module of larger size (332 x 220 mm, for example) they contain all the circuits necessary to form a microprocessor unit that is able to operate independently. Very often such microcomputers become the basis of educational microcomputers: merely by adding a special-purpose keyboard and several seven-segment displays, the user obtains at relatively low cost a computer on which he is able to see how a microprocessor operates and is programmed, to test the basic principles of circuit design, and to learn how to control such systems by means of programs. All the advantages of educational computers are utilized mainly in professional microcomputer courses.

The solution of more complicated application tasks has necessitated an entirely different approach to the efficient use of microcomputer technology. The need to build new types of microprocessor systems merely by minor modifications of existing ones has led to the development of modular microprocessor systems, i.e., of systems in which a module contains circuits that are interconnected but usually are unable to operate independently. Only by connecting several of these modules do we get an equipment that is capable of solving the given problem.

The individual modules, of course, may differ in their complexity. It is determined by the modular system's overall concept, the components used, the size of the modules, etc. Mostly modules on printed-circuit boards 100 x 160 and 160 x 220 mm or larger are being used at present. Modular systems with larger modules usually are able to solve even problems of considerable complexity, and they often permit the designing of multiprocessor systems.

In view of the present and future tasks of our work station, we chose the second variant, i.e., the application of a microprocessor system of the modular type. This concept offers a number of advantages:

--With equipment of the modular type it is possible to design even more complex control systems;

--The equipment can be expanded gradually; it can be used successfully for the given applications, while additional modules are developed simultaneously or subsequently to make the modular system suitable for future applications as well;

--The circuitry, particularly the number of input and output signals, can be changed merely with multiples of certain modules;

--It is easier to change over to more modern components and thereby to innovate the entire system;

--A valuable advantage is the universality of some of the modules, and thereby the feasibility of manufacturing them in advance, without knowing what the specific applications will be; this shortens considerably the time between the formulation of the application problem and the actual installation of the completed control system.

Before the actual design of the microprocessor system, additional criteria were set that, in our opinion, influenced both the development of the modular system and its installation for specific applications.

The first criterion was module size. The so-called small European format was selected, i.e., a module board 100 x 160 mm, with an FRB 62-pin indirect connector. This design is convenient from the viewpoint of using the elements of the ALMES mechanical modular system. Generally speaking, the use of an indirect connector is less advantageous. But under our conditions, when it is difficult to ensure direct connectors (or contacts) of good quality, the indirect connector is a necessity.

The small module-board format was selected to facilitate the production of smaller modules, whereby the modular system becomes more accessible to more users. (Printed circuits of larger size usually must be made by specialized manufacturers whose lead time is longer.) Another reason was that the small format offers greater flexibility in designig the modules, and our objective was to develop a modular system that would be available within the shortest possible time. But this modular system does not and cannot compete under any circumstances with the modular systems that have already been theoretically elaborated and designed (at the VUVT [Research Institute of Computer Technology], the VUAP [Research Institute of Automation Equipment], Tesla of Kolin, Tesla of Strasnice, etc.), even though it does have certain advantages over them.

Another criterion was the use of a common bus for all the modules. Signals were permanently assigned to the connector's individual pins according to Table 1 [11, 13]. Naturally, a standard system bus presents certain limitations for the designing of printed circuit, but it also offers a number of advantages:

--Interconnection of the card cage by means of a motherboard is very simple and eliminates the mistakes that occur in the case of conventional wiring;

--Interconnection of the card cage is less labor-intensive;

--The modules may be plugged into any of the slots;

--The characteristics of the interconnection are constant (no parasitic capacities);

--The equipment is more reliable;

--The debugging and testing devices and aids are of more simple design;

--Ease of expansion, and the feasibility of using modules designed at other work stations using a compatible bus.

The third criterion was the use of components that were available in our market or were being prepared for production. This requirement is now regarded as natural, and most potential users specify it. Therefore the basic configuration of the modular system is designed with a minimum of special components. (There are problems at present with the DIL 40 sockets, etc.) If some modules are designed with foreign components, that is done usually to solve the customer's special requirements in cases when series production is not being planned, and the use of these special components considerably speeds up and facilitates development.

And finally, the last criterion was ease of production, debugging and testing. Because very few workplaces are equipped as yet with the necessary instruments and tools to work with microprocessor circuits, such as logic analyzers, memory oscilloscopes, emulators, etc., it was necessary to take also this into account in developing the modular system. As emphasized earlier, the chosen module-board size and the related breakdown of the circuitry into relatively simple

units contribute considerably toward meeting these requirements. This problem will be discussed in greater detail below.

2. Modular System's Configuration

So far, the modular system has the following modules, which have already been tested by 30 April 1982:

--CPU 80, the basic module with an 8080A microprocessor, support circuits 8224 [clock generator], 8228 [system controller] and 3212 address bus amplifier, and an 18.432 MHz crystal; the module also has a voltage converter (-5 V), and a circuit that permits the connection of I/O circuits by the method of memory mapping;

--CPU 80A, the same as module CPU 80, except 3216 circuits are used to amplify the address and data buses; this module is suitable for larger configurations of the modular system (Fig. 1);

--EPROM, a module for connecting four EPROM chips (or eight and eight PROM chips). The EPROMs are types 2708, 2758 or 2716. The type of memory is chosen with interfaces;

--RAMAKU, a RAM module with a capacity of 2 Kbytes, an address decoder with addressing options, and 16 sockets for memory chips of types 2102, 1902 and K 565 RU2; it also has batteries and a charger that permit the memory, in the case of 1902 chips, to operate for several hours even without power supply from the power line (retention of memory) [7];

--KLADIS, a module that permits the attachment of up to 16 seven-segment displays, and of a keyboard with a maximum of 16 x 4 keys; the module also has a circuit that can generate three different acoustical signals to indicate, for example, the depression of a key, an error, etc. (Fig. 2);

--KLADIS 79, a module for connecting up to 16 seven-segment displays of the LQ 410 type and, with the help of circuit 8279, a keyboard that has a maximum of 8 x 8 keys and the capability to generate three types of acoustical signals (Fig. 3);

--SVARIO, input-output processing module that can handle a maximum of 18 input and 18 output signals; all signals can be separated by opto-isolators; if opto-isolators are not used, it is necessary to install interfaces, in which case the external signals may be bidirectional;

--MUXMAG, a module that enables the connection of a tape recorder as an external memory with a slow transmission rate (about 10 cps), and handles eight interrupts (circuit 3214); it has a programmable clock of discrete elements, a synchronizing circuit that synchronizes the equipment with the network frequency, and a circuit that signals loss of power;

--RAM 4, a static RAM module with a capacity of 4 Kbytes, with 2102, K 565 RU2, etc. memory chips;

--ZDROJ, a power-supply module that supplies all the voltages necessary for the TEMS 8000-PAS modular system's operation: +5 V/6 A, +12 V/0.5 A, -12 V/0.5 A, +26 V/0.2 A, -5 V/0.3 A, and 12 V a.c.;

--DIS 32, a module for connecting a CRT display or an ordinary TV, to display 32 lines of 32 characters each; the characters (a total of 251 possibilities) can be chosen by varying the content of two character generators (EPROM); with the help of two characters (markers), the module is able to highlight any string by reversing the field, and individual characters by blinking, and to suppress the display of any part [10] (Fig 4).

Furthermore, the following modules have been designed:

--TRAMO, a routing module that facilitates debugging of the system and of the software as well; it permits running the program step by step, stopping at the selected address, on the issued instruction or at the specified data, changing the data in the RAM, and displaying the state of the address, data and control buses after each cycle or instruction [1];

--PROGR, a module for programming the EPROM and PROM chips [2];

--RAM 16, a 16-Kbyte static RAM with anticipated memory chips of the 2114 type whose production in Czechoslovakia is now being prepared;

--SIO 4 contains four 8251 chips for serial data transmission, with the necessary auxiliary circuits;

--PIO 48, a module for processing 48 I/O signals; a part of the signals is also amplified in parallel, for the case when a printer or tape punch, etc., is connected;

--PRER 40, a module that handles up to 40 service requests, utilizing the characteristics of chip 3214;

--CAPAM, a module that contains 1 Kbyte of RAM (chip 2114), an 8253 interval timer, and an 8251 chip for serial data transmission; handles up to 8 service requests and has circuits for connecting a casette tape recorder as a slow (10 characters per second) external memory;

--SIM 48, a module for testing programs written for the expected 8048 chip; the program can be run step by step [13].

In addition, the following modules are being prepared:

--DIS 80 for connecting a CRT through chip 8275, utilizing all its capabilities, including a light pen;

--CPU 80B, a module with an 8080A processor, support circuits 8224 and 8228, 1 Kbyte of RAM (2114) and 2 Kbytes of EPROM (2716);

--DYRAM XX, a dynamic RAM module;

--RECAS, a real-time module using OMA (DCF) signals;

--XXXXX, a module for processing analog signals; and

--YYYYY, a module with a thermal printer (20 characters/line).

3. Production, Debugging and Testing of the Modular System's Modules

In designing the TEMS 8000-PAS modular microprocessor system, consideration was given to the ease of realization, and also to the feasibility of making modifications, in order to use the same or similar equipment for the solution of different applications. The philosophy of debugging and repairing the modules was likewise based on the advantages of the TEMS 8000-PAS system's modular concept. It led to the development of TOZAM (module testing and debugging equipment) [3].

This instrument comprises several modules (CPU 80, PROM 8, KLADIS and RAMAKU) and a simple terminal. It too is housed in an ALMES cabinet. It is able to test the modular system's individual modules (with the exception of modules CPU 80 and CPU 80A whose thorough and complete testing is too demanding, and therefore they are tested only through the proper functioning of the entire designed equipment).

To facilitate debugging, certain simple aids were tested and found suitable during the debugging of the modular system's functional model. These included, for example, the following: the SOPR current probe [4] that makes it easier to find the short circuits in the modules, without mechanical damage to the printed circuits; the PAMOS memory attachment to an oscilloscope [5] that converts an ordinary oscilloscope into a memory oscilloscope (for logic signals); and the PIPLE instrument [6] that facilitates the static debugging of the modules.

It can be said that the entire modular system can be debugged with these aids, plus a logic probe, an ordinary oscilloscope and an ordinary measuring instrument (for example, a PU 120). Naturally, instruments of better quality (analyzers, emulators, a memory oscilloscope, etc.) will always speed up development and debugging.

4. Conclusion

The purpose of this contribution has been to acquaint readers and the wider engineering public with the newly developed equipment that is based on modern microelectronic components.

Work on the TEMS 8000-PAS modular system utilized the basic systems concept (the bus and module-board format) developed by Engineer Bartak, a staff member of the PVU [Design and Development Institute], Geophysics National Enterprise, Brno [11, 12]. The modular system was developed independently at the Brno work station of the Tesla-Eltos Institute of Microelectronic Applications, in conjunction with the development of specific applications for the automation and control of technological processes. Informal cooperation with Engineer Bartak continued on problems that were common to both work stations. At present work on applications is proceeding independently at the two work stations.

Table 1. Description of the TEMS 8000-PAS Bus

Pin	Signal	Direction	Description, active level	Pin	Signal	Direction	Description, active level
1	+ 5 V	IN	Power supply	2	+5V	IN	Power supply
3	$\overline{I/OW}$	OUT	Input/output write	4	+12V	IN	Power supply
5	IND0(—5V)	X	Individual (power supply)	6	$\overline{I/OR}$	OUT	Input/output read
7	DB7	IN/OUT	Data bus, high	8	IND5	X	Individual
9	IND1 (+25V)	X	Individual (power supply)	10	A 11	OUT	Address bus, high
11	DB6	IN/OUT	Data bus, high	12	I 7	—	Interrupt 7
13	IND2(D5)	X	Individual (D5 of 8080)	14	A 10	OUT	Address bus, high
15	DB5	IN/OUT	Data bus, high	16	I 6	—	Interrupt 6
17	$\overline{INTA}$	OUT	Interrupt abort	18	A 9	OUT	Address bus, high
19	DB4	IN/OUT	Data bus, high	20	I 5	—	Interrupt 5
21	$\overline{INTE}$	OUT	Interrupt enable	22	A 8	OUT	Address bus, high
23	DB3	IN/OUT	Data bus, low	24	I 4	—	Interrupt 4
25	$\overline{INT}$	IN	Interrupt request	26	A 7	OUT	Address bus, low
27	DB2	IN/OUT	Data bus, low	28	I 3 (TRAP)	—(IN)	Interrupt 3
29	$\overline{HOLD}$	IN	Processor disconnected f/bus	30	A 6	OUT	Address bus, low
31	DB1	IN/OUT	Data bus, low	32	I 2(RST7.5)	—(IN)	Interrupt 2
33	HLDA	OUT	Hold acknowledged	34	A 5	OUT	Address bus, low
35	DB0	IN/OUT	Data bus, low	36	I 1(RST6.5)	—(IN)	Interrupt 1
37	BUSEN	IN	Bus enabled	38	A 4	OUT	Address bus, low
39	RDYIN	IN	Data ready	40	I 0(RST5.5)	—(IN)	Interrupt 0
41	WAIT	OUT	Processor wait	42	A 3	OUT	Address bus, low
43	$\overline{MEMW}$	OUT	Memory write	44	A 15	OUT	Address bus, high
45	$\overline{RESIN}$	IN	Reset input	46	A 2	OUT	Address bus, low
47	$\overline{MEMR}$	OUT	Memory read	48	A 14	OUT	Address bus, high
49	SYNC	OUT	Synchronize bus cycle	50	A 1	OUT	Address bus, low
51	RESET	OUT	Reset system	52	A 13	OUT	Address bus, high
53	STSTB	OUT	Synchronize control word	54	A 0	OUT	Address bus, low
55	02TTL	OUT	Clock	56	A 12	OUT	Address bus, high
57	IND3(~U)	X	Individual (a.c.)	58	IND4(~U)	X	Individual (a.c.)
59	—12V	IN	Power supply	60	OSC	OUT	Oscillator
61	GND	—	Signal ground	62	GND	—	Signal ground

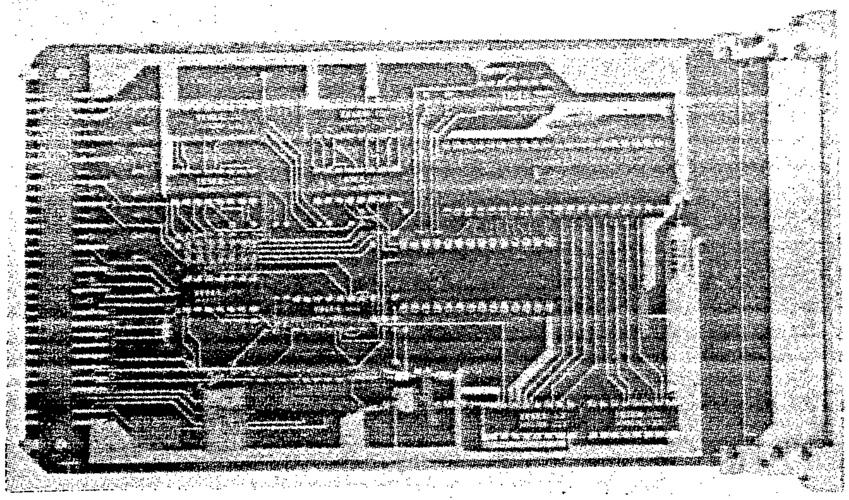

Figure 1. The CPU 80A module.

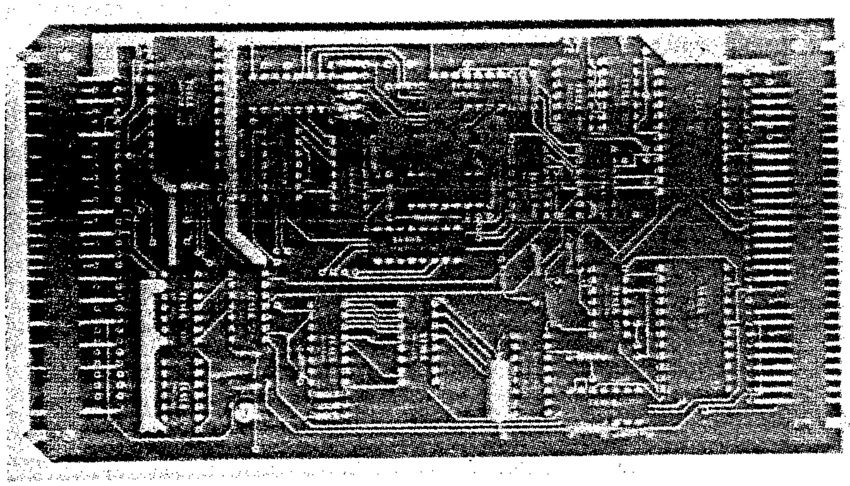

Figure 2. The KLADIS module.

The Geophysics National Enterprise is working primarily on applications for the acquisition of geophysical data (the Geomics system), while the Tesla-Eltos Institute of Microelectronic Applications is working on applications in the area of technological process control.

From the experience to date it can be established that the TEMS 8000-PAS modular system is suitable for both of these areas of application. Its main mission is to enable the rapid installation of microelectronic components for practical applications at production plants. On the basis of a broadly interpreted system of instruction that employs the TEMS 80-03A educational computer, a number of microelectronics specialists have been trained. The purpose of the TEMS 8000-PAS modular system is to enable these specialists to utilize

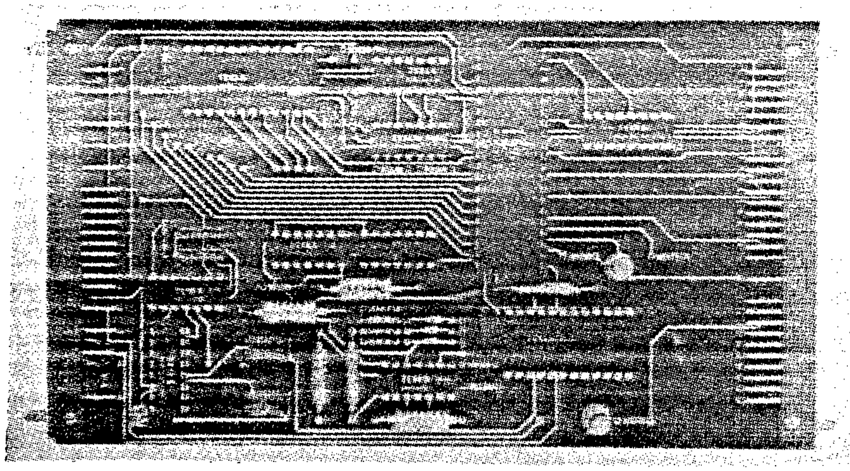

Figure 3. The KLADIS 79 module.

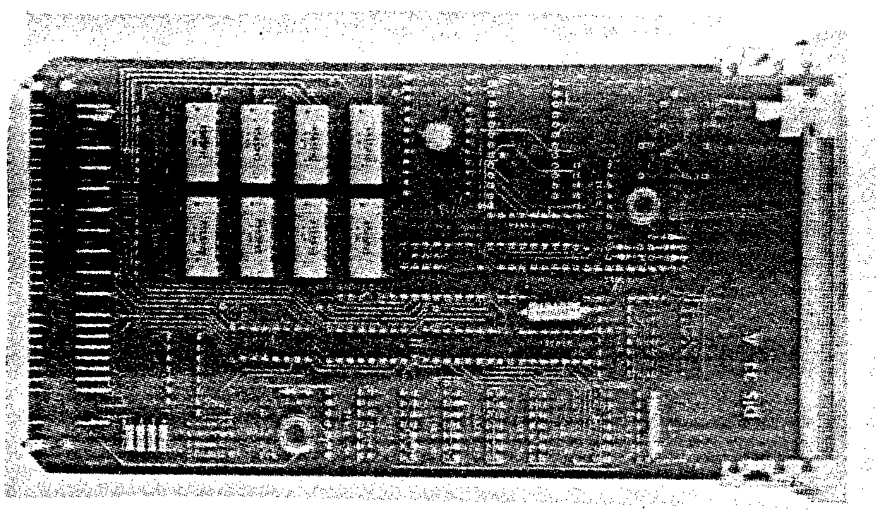

Figure 4. The DIS 32 module.

in practice within the shortest possible time the knowledge they have gained, on specific applications within the framework of the program for the widespread use of electronics in the national economy, as outlined by the 16th CPSU Congress.

On the basis of the described TEMS 8000-PAS system, the Tesla-Eltos Institute of Microelectronic Applications will offer at the beginning of 1983 a series of courses that will be geared specifically to the area of practical technological innovations. Admission to these course will be from among applicants from Czechoslovak organizations who apply with the intention of using the TEMS 8000-PAS system for some specific application, in accordance with the needs of the sponsoring organization.

Two students will be assigned to each application, and a complete TEMS 8000-PAS system will be made available for it. This will include the mechanical parts, and a appropriate set of printed circuits and components. During the course, the students will install and debug the modules, under the guidance of their instructors. When the course ends, the complete system, including the peripherals, will become the property of the sponsoring organization. During the course, the students will write the applications software.

The purpose of the course is to acquaint the students with the TEMS 8000-PAS system and to prepare functional models of industrial applications, using the TEMS 8000-PAS industrial modular system. Since enrollment in the courses will be limited, a competition will be held for the most suitable intended applications. Persons interested in applying can obtain details about this system of instruction at the 1982 Brno International Engineering Fair, and at the 1983 INVEX Exhibition.

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Robotization in Slovakia

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 8, 1982 back insert

[Text] Reorganization of the SAV [Slovak Academy of Sciences] Institute of Engineering Cybernetics into a scientific production unit with special status in the system of SAV and CSAV [Czechoslovak Academy of Sciences] institutes for basic research will permit faster development of robotization in Slovakia under the current five-year plan. The newly formed integrated complex will comprise departments for research, development, design, technology, and production. The first product of the institute, the SM 5050 computer, is already out. The reorganization will support the efficiency of the science-research-development-production-application cycle.

At present the mentioned SAV institute is devoting primary attention to research, design and experimental production of information and control systems for robotization. This involves the mechanisms for higher generations of industrial robots, specialized computer systems for artificial intelligence (the science of solving tasks that up to now required human intelligence), and robotization. In addition to the Institute of Engineering Cybernetics, 21 organizations from the entire republic are participating in the solution of the tasks. The institute itself is directly coordinating three of the four principal tasks. The target program calls for designing a robot system that will be able to orient itself in the working environment. The robots will be used for automatic materials handling, the installation of machine subassemblies and subsystems, and for quality control as well.

It is certainly understandable that both the theoretical and the engineering complexity of these tasks--robots, and artificial intelligence--exceed the capabilities of the individual CEMA countries to solve them independently. Therefore international cooperation with six foreign institutions in other socialist countries has been ensured contractually for the period of the 7th Five-Year Plan. The advantages of socialist economic integration are expected to manifest themselves in this important field as well.

Summaries

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 9, 1982 front insert

[Excerpts] "Production Scheduling With an Enterprise's Automated Management System," by Engineer Jan Rollo, CSc: The problem of scheduling small-series production, solved within the framework of state task SPEV III-3/3.8, is discussed. The optimization of production schedules, the conditions of solution, and the software are described.

"The IDMS Data Base System," by Engineer Rastislav Macek: Information is presented on the basic properties and functions of this system that has been implemented on JSEP computers.

"Application of the SPU 800 System," by Engineer Zdenek Krejcik: Some applications of this system within the PVT [Computer Technology Enterprise] are discussed. Especially data preparation on a casette, the solution of direct input from the casette and from an EC 1021 computer, and the substitution of this system for the reference typewriter of the EC 1030 computer are described.

"Use of Statistical Methods in Managing a Computer's Multiprogramming Operation," by Engineer Stanislav Chovanec, CSc: The use of statistical methods in managing computer centers is a very timely problem. The author describes the feasibility of using such methods that have been tested on an EC 1030 computer. He discusses the elements of performance as functions of the work load, and the management and control of a computer's closed multiprogramming operation.

Electronics Research Results Exhibited

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 9, 1982 p 339

[Article: "Days of New Technology in Electronics Research"]

[Text] This year the traditional "Days of New Technology in Electronics Research," which the Tesla A. S. Popov Communication Engineering Research Institute holds every year, had a very attractive content. Besides the Tesla research stations, this year also other organizations of the Federal Ministry of Electrotechnical Industry and the scientific institutes of the CSAV [Czechoslovak Academy of Sciences] exhibited the results of their work, for the first time. The presence of Professor Engineer Milan Kubat, DrSc, the federal minister of the electrotechnical industry, and of Academician Bohumil Kvasil, the chairman of the CSAV, at the ceremonial opening of the exhibition on 12 June of this year, in the House of Culture, Prague 4, symbolized the close link among science, research and practice.

A score of exhibitors offered, in cleverly arranged exhibits, an overview of the most significant results of their activity, and thereby also proof of the effectiveness of cooperation in solving the principal tasks in the area of electronics. The nearly 100 exhibits represented novelties in the fields of electronic materials, components, integrated circuits, instruments and equipment for microwave technology, vacuum electronics, consumer electronics, measuring and testing equipment, optoelectronics, telecommunications, digital technology, and communication equipment. Thus the exhibition gave a fairly complete picture of the present level of Czechoslovak electronics and its main trends that reflect changes in the traditional approach and confirm the unique role of the electronics industry in the national economy, as this was emphasized in the proceedings of the 16th CPCZ Congress and at the 36th CEMA session held recently in Budapest.

We viewed with interest particularly the exhibits in the field of digital and computer technology. Tesla Elstroj [Electrical Machinery] and Tesla of

Strasnice jointly exhibited the SAPI 80, a modular microprocessor hardware system for building decentralized control systems, and systems for data acquisition and processing. This system can operate autonomously or as an intelligent terminal controlled by a JPR 12R minicomputer, or a developmental microprocessor system can be formed with it. Its applications are versatile, and its production is expected already in 1983.

This same cooperation produced also the exhibited prototype of a single-board minicomputer based on the MH 3000 microprocessor circuits and the JPR 13 program control unit; it is fully compatible with the JPR 12 minicomputer and with the units of the SAPI system. The single-board minicomputer is an improved version of the JPR 12 minicomputer and serves as the control unit of the SAPI system for the automated acquisition and processing of information, process control, in automated management systems, and for other applications.

Two types of intelligent terminals also were displayed at the exhibition. The IT-20 (Research Institute of Mathematical Machine, Prague) is a language-oriented (BASIC 20) desktop aid to computation that serves, for example, to control measuring systems, to acquire and preprocess data, as a terminal subsystem of a higher-order computer, etc. It has a keyboard, cassette memory and CRT display; a number of input-output devices can be connected to it. The ITTS intelligent terminal (CSAV Computer Center) is controlled by a JPR 12 processor and is designed as a terminal of the JSEP computer system. Its main function is to mediate the batch processing of tasks. Other applications are data preprocessing, data conversion between input and output devices, interactive program debugging, monitoring and control of scientific experiments, etc.

Other exhibits by the Research Institute of Mathematical Machines included its SAPR computer-aided design system for the planning, design and production of electronic digital equipment, and also its CONSUL 2111 graphics printer (for drawing diagrams and the printout of control patterns, charts, graphs, etc.).

The Tesla A. S. Popov Communication Research Institute exhibited its signal-processing microcomputer that is based on the MH 3000 microprocessor system and is intended as a development tool for constructing the algorithms of digital filters, and for the digital processing of l-f signals in the entire acoustical band. Besides acoustical research (synthesizer, speech analyzer, etc.), it can be used in consumer electronics, studio equipment, and anywhere increased requirements are set for speed and special software.

Instruments and equipment for the further development and widespread application of microelectronics likewise attracted attention. For example, the PSK 92 065 programming equipment that contains a source of programming pulses to program the semiconductor PROM memories, or the ROM memory for the EMG 666 calculator with 8 x 2 bytes capacity (both developed by Tesla of Pardubice). Important tools for the designers and users of microelectronic systems are: the TTL set of laboratory instruments for logic testing and of microcomputers with an 8080 microprocessor (Tesla A. S. Popov Communication Engineering Research Institute); the PY 2 testing system for static measurements and dynamic function tests of microprocessors, microprocessor circuits and memories (Tesla of Piestany); the XP 832 16 logic board tester to check the proper functions

of logic networks (Tesla of Pardubice); the ZP-65 memory module tester for function tests and for measuring the dynamic parameters of integrated memory circuits, memory boards and systems (Industrial Automation Works, Kosire); and other equipment.

The "Days of New Technology in Electronics Research"--the exhibition and the accompanying series of lectures--demonstrated that electronics is developing along the right path, and that the results of the R & D work stations in Czechoslovakia are good.

SPU 800 System's Applications

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 9, 1982 pp 344-346

[Article by Engineer Zdenek Krejcik, Computer Technology Enterprise, Prague: "Application of the SPU 800 System"]

[Excerpts] Our enterprise has been cooperating already two years with the manufacturer of the SPU 800 system, the ZVT [Computer Technology Plants] of Banska Bystrica, on the further development and applications of this system. This very fruitful cooperation between the manufacturer and one of the largest users has concentrated on the preperation of data on cassettes, and not only on the data-preparation program itself, but also on the related solution of the direct input of data from cassettes into the computers most commonly used at the Computer Technology Enterprise (computers EC 1021, EC 1030 and EC 1033).

The mentioned applications always use the TP 8 terminal processor, the nucleus of the SPU 800 system. It is an 8-bit processor built exclusively with integrated circuits produced in CEMA countries. It has 16 registers, and in its basic configuration 8 Kbytes of RAM and 1 Kbyte of ROM, with provisions for expansion up to 64 Kbytes, using expansion modules. The set of insstructions includes particularly all logic operations, shifts, arithmetic addition and subtraction with carry, conditional and unconditional jumps, and instructions for work with the peripherals. The execution time of an instruction, depending on its type, is either 2.4 or 4.8 microseconds.

SPU 800 As Input Device of the EC 1021 Computer

This application of the SPU 800 system arose from the need to solve the input of data from cassettes into the EC 1021 computer more economically than with costly converters. The devised method permits input into the EC 1021 computer not only from the cassette drive, but also from any other peripheral of the SPU 800 system. This means in particular that input from floppy disks will be problem-free once the series production of this system begins.

The solution presupposes that in most cases it will be used with the EC 1021 computers already in production. A primary requirement, therefore, was to rule out any modification of the EC 1021 computer's hardware. Since it was assumed that cassettes would gradually replace punched tape, the punched-tape controller was used to keep the design as simple as possible. Therefore the principle of simulating the FS tape reader was adopted. This meant adding to the SPU 800 system an interface card and a cable with the same terminals as for the

FS 1503 reader. This provides a relatively low-cost solution to the aforementioned problem, and it is easy to implement. The block diagram is shown in Figure 1.

An essential part of input, of course, is a special program for the TP 8. Various combinations of the SO register are used to simulate the FS reader's signals:

SO_0 - Data entry
SO_1 - Set clock track
SO_2 - Set "Data ready" flip-flop
SO_3 - Reset clock track
SO_4 - Set "Tape loaded", "Arm closed"
SO_5 - Reset "Tape loaded"
SO_6 - Reset "Data ready"
SO_7 - Reset "Arm"

The execute signal in each case is the CEO pulse. Otherwise control of the machine instructions is the same as for the other peripherals.

A special program was written for the TP 8 to control the direct input of data from cassettes. The program is recorded on cassette tape and uses two buffer registers to achieve the full rate of input into the computer.

The program was designed partially as a universal program in order to transmit to the computer data from cassettes prepared on other systems. The program's introductory part identifies the cassette, after rewinding it to start. If the cassette contains data prepared on some system other than the SPU 800, the program transmits the data to the computer character by character, without skipping and selection of the data blocks. The program translates the tape mark (TM) as 160 null characters and three "FF" characters.

When the program identifies the data on the cassette as prepared on the SPU 800 system, it skips in fast forward the data preparation program on the cassette and transmits the data to the computer from the HDR1 format. A special program (module) in the EC 1021 computer analyzes the format for further prcoessing. The program translates the end-of-file mark (TM) on this cassette as "AA" characters, as many as equal the length of a data block. The program translates the end of a track on the cassette as the same number of "55" characters.

The program uses two buffers in the memory of the TP 8. It alternately reads data from the cassette into one buffer, and transmits data from the other buffer to the EC computer. Both branches of the program have their own address registers. The states (read into buffer 1, 2, and empty buffer 1, 2) are defined in the registers of the TP 8. The changeover from one branch to the other always occurs in the waiting loop for SI (data ready for receiving or sending). In this way it is possible to achieve the full transmission rate determined by the rate of the cassette drive. (The cassette reads continuosly, unless there is repetition after a tape error or the computer is doing computations.)

Substitution for the Reference Typewriter of the EC 1030/33 Computers

The reference typewriter of the EC 1030/33 computers is one of the less reliable peripherals. This is customary in peripherals that are predominantly

mechanical. Even though equipment of this type is relatively cheap, it is now standard practice to equip better computers with a display for communication between the operator and the computer. Besides a lower frequency of breakdowns, the advantage of this substitution is greater input speed.

There are several solutions to substitute a display (a VT 340, for example) for the typewriter also in the case of the EC 1030/1033 computers. However, the drawbacks of these solutions are that they are not readily available, their price is high, and they require fairly extensive modifications of the typewriter's controller.

A solution employing the SPU 800 system does not have these drawbacks. It has been elaborated in detail for the 7077 controller (two-cable connection of the typewriter without using the special keys). For a 7070 controller it will be necessary to add a small control panel, with the same elements as in the case of the 7077 controller (Vnimaniye, KT. etc.).

A special card, in combination with a special program for the TP 8 terminal processor, accurately simulates the electrical signals of the typewriter and analyzes the signals received by the typewriter. Because the magnets of the typewriter's print hammers are excited from two coordinates X and Y, after conversion to the TTL level these signals are analyzed successively, and the occuring combinations are converted into the ISO code. The contacts of the matrix where a combination corresponding to the input character occurs are replaced by voltage-sensitive I/O gates and are excited from flip-flops set by instructions from the TP 8. In the same manner, the other auxiliary circuits of the typewriter are simulated by means of flip-flops and gates.

The individual operations are defined by the following states of the SO register, from which the principle of programming is evident:

SO
3210
0000 - set matrix;
0001 - set "Signal";
0010 - reset "Signal";
0011 - not used;
0100 - set "Black";
0101 - set "Red";
0110 - set "Lower Case";
0111 - set "Upper Case";
1000 - not used;
1001 - reset "I/O";
1010 - set "Typewriter Ribbon";
1011 - set "Print";
1100 - reset "Print";
1101 - reset "Typewriter Ribbon, Return, End of Line";
1110 - set "Return"
1111 - set "End of Line."

The interface is designed as a (double) card added to the TP 8. Connection is achieved by plugging in the cables disconnected from the typewriter (the card's

ports are the same as on the typewriter). No modification of the controller is necessary. Merely some of the timing circuits have to be reset to increase the transmission rate.

Output From the EC 1021 Computer to a Cassette Drive

With the anticipated development of data preparation on cassettes, the question arises as to how this technology could be utilized, at the point where the source documents are generated (i.e., particularly at the customers of the computer centers), to make information processing as a whole more efficient. Therefore it is assumed that at the more important points the SPU 800 systems will be equipped also with printers and eventually with equipment for data communication. The importance of such equipment lies not only in the feasibility of generating outputs at the points where the data were prepared, but also in transmitting return information from the data processing center (error messages, etc.).

In view of the fact that there are as yet no cassette drives among the output peripherals for JSEP computers, the above problem can be solved only with the help of punched-tape or standard tape drives. The drawbacks of punched tape are common knowledge. To equip the described SPU systems with standard tape drives would be prohibitively expensive (200,000 krounas), nor would it be realsitic in view of the limited availability of such drives.

Direct output from an EC 1021 computer to a cassette drive has been solved, for the aforementioned reasons. In addition, this makes possible the processing of certain files on cassettes, in agreement with the customer, enabling him to scan the files on his own system, and to select or print only certain parts of the files.

The solution does not require any modification of the JSEP computers. A single card and a special program are being prepared for the TP 8. Installation requires only reconnecting the cable from the EC 1021 computer's tape punch to the card's port and can be completed in a matter of seconds. At the computer centers that will be equipped with TP 8 terminal processors for input, it will be possible to use the same equipment for both functions. Eventually it will be possible to apply this solution also to other peripherals of the SPU 800 system, particularly a floppy disk drive. Its spreading is merely a question of deliveries and of the program.

Consul 2712 Floppy-Disk Station

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 9, 1982 pp 347-348

[Article by Jiri Vilimek: "The Consul 2712 (EC 9112) One-Operator Data Acquisition Station With Floppy Disk Drive"]

[Text] With its functional capabilities, the Consul 2712 station is a further qualitative element in the line of data acquisition equipment to optimize the data acquisition system. Its intended basic application is decentralized data acquisition at individual locations where the data are generated. However, its parameters make the Consul 2712 station suitable also for installation in

departments for the centralized preparation of input data. Here, in a suitable configuration with two-operator Consul 2711 (EC 9111) stations, it completes a closed cycle of data acquisition with the random-access editing of the diskettes and their transfer to standard 0.5-inch magnetic tape that the computer is able to process directly.

The station has a control panel with an alphanumeric electronic keyboard, a decimal keyboard, and function keys. The display shows a total of five lines of 40 characters each. The status line informs the operator about the state of the equipment. The four data lines are for visual checking of the entered input that may be up to 128 characters long, and for displaying the name of the input data field. It has two disk drives: the right one for reading and writing; the read-only left drive is intended for copying diskettes.

The electronic module has its own power supply, a CRT screen, an assembled microprocessor, three character counters, three accumulators for the sums of the fields, eight 128-byte program memories, and interfaces for connecting the Consul 2111 serial printer module and the CM 5300 tape drive module. In addition to the basic DKOI (EBCDIC) code, the station permits the selection of also the SMEP [System of Small Electronic Computers] code (KOI 7, ASCII). The station can be installed in an ordinary office environment.

Data entry on a diskette is by sentences up to 128 characters long, and a total of 1898 sentences can be entered. When recording is program-controlled, sentenceds up to 1,024 characters long can be entered by means of chaining. Up to 237 such sentences can be recorded per diskette.

Basic functions:

--Input, editing and checking of the entry, without or with program control;

--Program control permits entering up to eight program masks in the machine's memory, control of the length of the entered data fields, extraction of the alphanumeric content, justification of the data fields' right margin, manual or automatic duplication of the data from the preceding entry, insertion of check marks, and automatic transfer to the diskette;

--Search operations according to content or address make it possible to quickly locate data in a file on the diskette by specifying the search mask, perhaps to edit or supplement the displayed data, and then to reenter them;

--Insertion of a data block creates room on the diskette for the additional entry of up to 99 data blocks, in the required sequence;

--Three counters record the number of characters entered, the number of characters corrected during editing, and the number of data blocks entered, to monitor the operator's performance.

Expanded functions:

--Disk checking identifies on diskettes with a high error rate up to eight defective tracks and the number of damaged sectors in them;

--Diskette initialization writes on an unformatted diskette the systems address, track and sector marks, reformats a diskette that has a high error rate, and perhaps utilizes the two reserve tracks when setting the conditions for initialization;

--Display of the field name ensures the display of the text accompanying the appropriate fields in program-controlled data entry and serves as a guide to facilitate the operator's work;

--Disk copy uses the second, read-only disk drive to copy all or a part of a selected file; by using search operations according to content or address, it is possible to combine copying with program-controlled manual input, for example, when working with a glossary file, etc.;

--Summation of fields under program control permits the on-line or off-line totaling of fields in three accumulators, the tallying of the accumulators' content with the given field or its listing in that field. The on-line totals are used directly in the enter, edit and check modes; the off-line totals are used indirectly on records already entered, edited or checked, by blocks or in the entire file, with the help of a specified mask that automatically ensures program-controlled manipulation of the accumulators. The basic application is the computation of check totals, which in many instances eliminates the subsequent checking of the entered data.

The Consul 2111 serial printer module offers four types of printing, with or without format control. Without format control it prints the simultaneously displayed record (block), the appropriate file from beginning to end, a part of the file from the specified address, or selectively the records that match the specified search mask. The printer prints the records as they are stored on the diskette, i.e., a record block (sector) per line.

The printer prints with format control according to the formatter instructions stored in machine's memory. The formatters may be selected manually by the operator, or automatically by the first character of the record on the diskette. Moreover, the line format may be controlled directly by instructions in the data flow generated by the computer.

The formatter's set of instructions ensures horizontal tabulation, vertical alignment, various forms for printing a data field, the skipping of characters in the record forward or backward, the listing of designations stored in the program (table headings, etc.), the listing of the disk's side and record location, and selection of the ribbon color (black or red).

An edit word as a part of the controlling formatter permits the complete editing of the printed data fields, i.e., the insertion of commas, periods, slashes, signs, currency units, or any desired textual information.

The CM 5300 tape drive module permits the transfer of data from diskettes to standard 0.5-inch magnetic tape and conversely, by blocks 128 bytes long. Program control of the transfer can automatically add the address marks of the labels, file and the tape itself. The used tape is 216 mm in diameter, the recording density is 800 bpi, the type of recording is NRZI, the code is DKOI (EBCDI) or KOI 7 (ASCII), the capacity is six to seven diskettes per reel.

For the readers' information, we list the first users of the described Consul 2712 one-operator station, in various fields of application: Lachema of Brno, Industrial Automation Works of Brno, Electrical Rotating Motors of Brno, SONP [Unmited Steel Works National Enterprise] of Kladno, Ostrava-Karvina Power Plants of Ostrava, Tesla of Roznov, and Steel Structures of Zilina.

From the list of the Consul 2712 one-operator station's capabilities it is evident that its manufacturer, Zbrojovka [Munitions Works] Concern Enterprise of Brno, is contributing significantly toward the realization of modern data acquisition systems in various areas of the Czechoslovak economy.

Kolka 025 Robot System

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Slovak No 9, 1982 pp 356-357

[Article by Professor Engineer V. Kalas, DrSc, et al, Department of Automation and Control, Faculty of Electrical Engineering, Slovak Institute of Technology, Bratislava: "The Kolka 025 Robot System With Microprocessor Control"]

[Excerpt] The Kolka 025 robot system is equipment on which it is possible to demonstrate the automation of mechanical and electronic assembly, and of surface coating. The system is microprocessor-controlled. Synthesis of the robot system started out from the requirement of high accuracy in coordinating the mutual motions of the kinematic pairs.

The system's mechanical part is built of thin-walled steel sections of high rigidity. The system has five degrees of freedom, and electromagnetic control of the end effector. Rotating connections of the kinematic pairs mean that the robot's working space is spherical. The system's mechanical part is designed so as to minimize the effect of backlash on the positioning accuracy. Specially modified reducers and screws are used for this purpose [1, 2, 3].

The robot's numerically controlled servosystems have stepping motors that are built by MEZ [Moravian Electric Appliance Plant] of Nachod and operate in a 45-degree step mode in open structures. Step-splitting is possible, which further improves the system's accuracy. In addition, a so-called asymmetric compensation circuit [4] can be used in the system to control the stepping motors, which significantly improves their dynamic characteristics. Each degree of freedom has two microswitches whose positions can be set. They constitute the system's protection, and also the robot system's point of reference can be defined with their aid.

The control system's block diagram is shown in Fig. 1. It consists of a Tesla TEMS 80-04/0 modular microprocessor to which the necessary buses for communication with the stepping motors' controllers and the end effector's controller, and also memory circuits have been added. The microprocessor system has an 8080 microprocessor,and a 2758-type ROM with a capacity of 1 Kbyte in which the microcomputer's monitor is stored. The robot's control program is stored in 2758-type EPROM with a capacity of 3 Kbytes.

The microprocessor system also has control circuits for the display and keyboard through which the microcomputer can be controlled. The RAM for data has

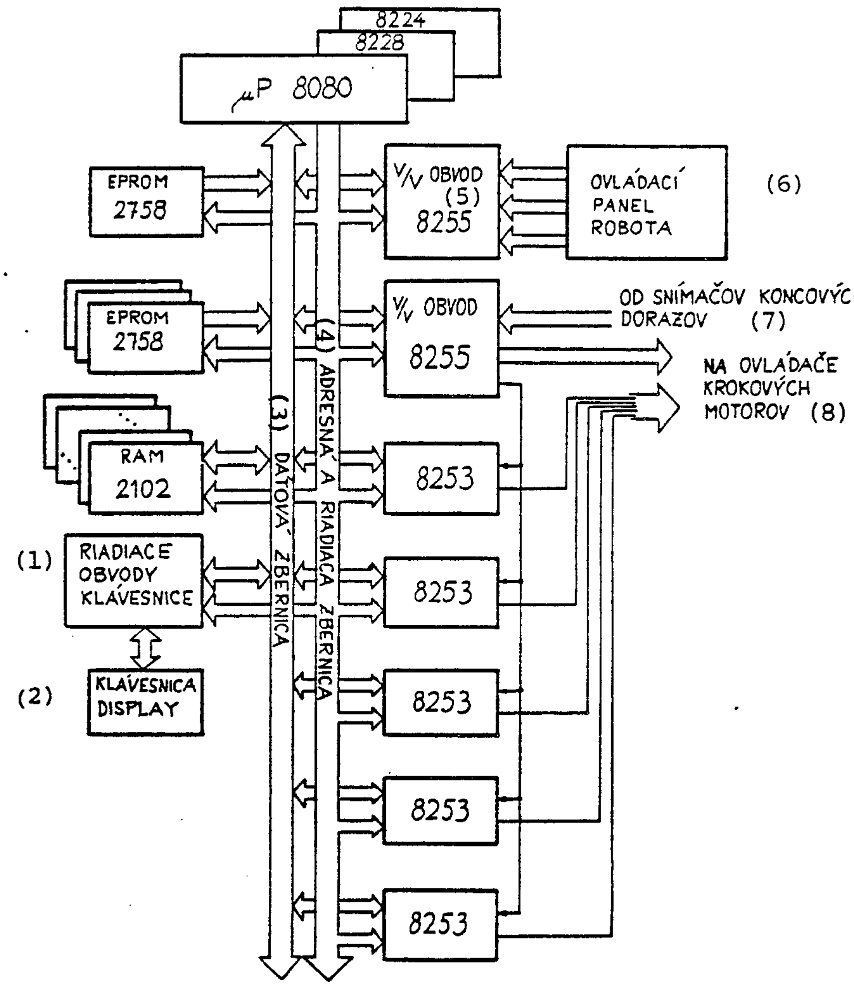


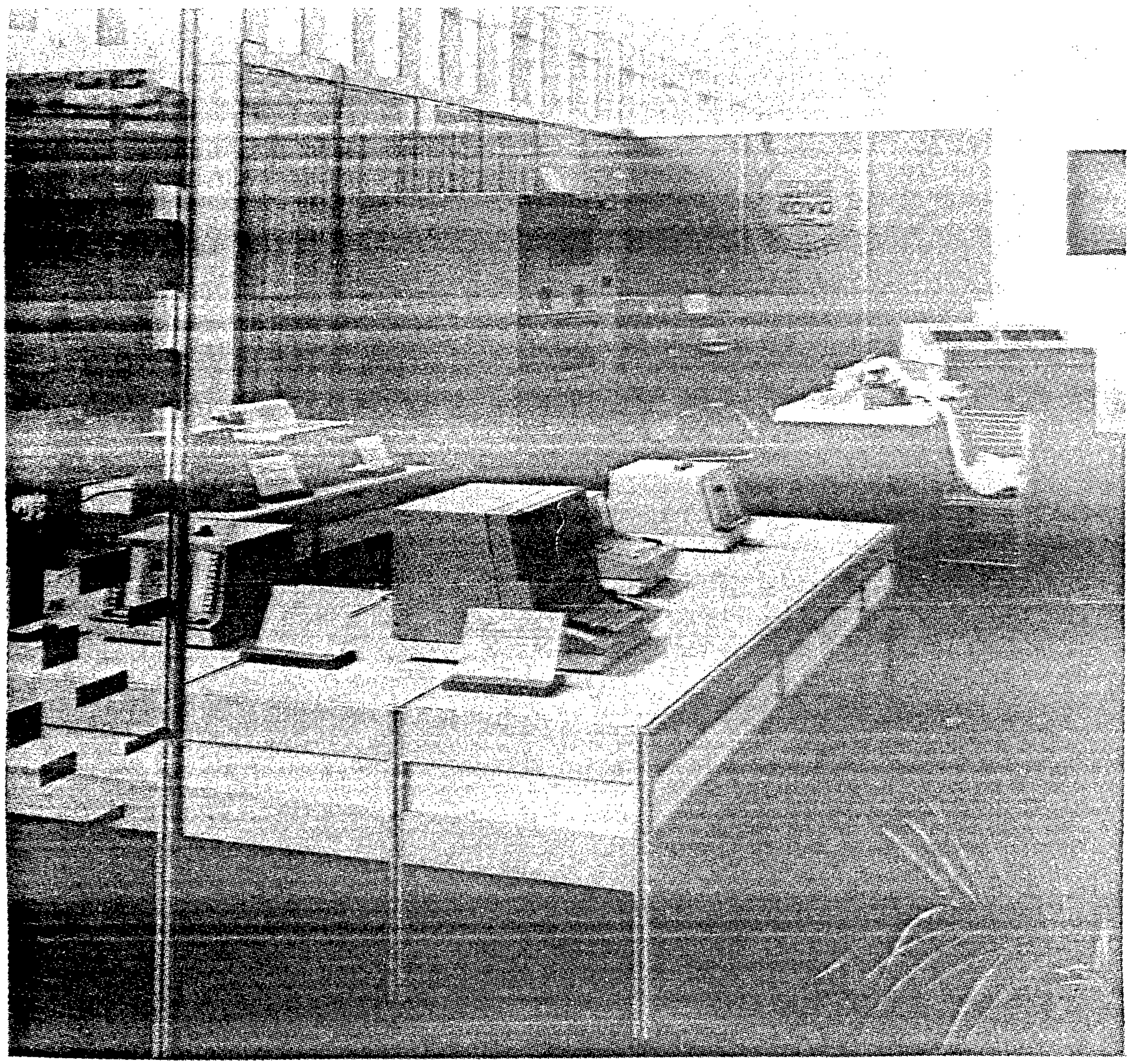
Figure 1. Block diagram of the robot's microprocessor control system.
Key:

1. Keyboard's control circuits	5. I/O circuit
2. Keyboard, display	6. Robot's control panel
3. Data bus	7. From stop sensors
4. Address and control bus	8. To stepping motors' controllers

a capacity of 1 Kbyte and consists of eight 2102 chips, in a 1K x 1 bit arrangement. The robot's control panel is interfaced with the microcomputer through 8255-type chips. The functions of this control panel are described below. One port of the second 8255 chip is defined as the input port through which the output signals from the microswitches for the first four degrees of freedom are fed to the computer. The position of one of the stops serves as the robot's point of reference.

Aritma Advertises Computer Equipment

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 9, 1982 rear cover



[Text] The Aritma Concern Enterprise of Prague (591 Luzna, 160 05 Prague 6-Vokovice) develops, manufactures and supplies modern computer equipment:

EC 8540 - Data acquisition and preprocessing system
EC 5075 - Floppy disk drive
EC 9080 - Card punch
EC 6112 - Card reader;
EC 6016 - Card reader;
A 1601 - Machine for depositing printed circuits

TEMS 80-03 A Educational Computer

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 9, 1982 p 358

[Text] Within the electrotechnical industry, the Tesla Eltos Sectoral Enterprise is participating in the task of spreading the use of electronics in the national economy, by supplying modern electronic components and also by expanding the services of its plants, particularly of DIZ (Contract Engineering Plant) and of IMA (Institute of Microelectronic Applications).

The TEMS 80-03 A special-purpose educational computers, developed at IMA, are intended for the needs of training in microprocessor technology and programming. However, they can be used for individual control applications as well. The chosen configuration and the software conform to these applications.

The TEMS 80-03 A educational computer, awarded a gold medal at the 1982 Brno International Engineering Fair.

The Tesla Eltos Institute of Microelectronic Applications has been providing training in microprocessor technology for technical personnel since 1979, and on-hands experience with specific systems has been a part of this training. The development and use of the TEMS 80-03 A microcomputer have made it possible to dispense with the importation of similar equipment.

The core of the instrument is an 8080 microprocessor. The basic configuration consists of a single-board computer that is able to function autonomously, and a board of demonstration peripherals. The two boards are installed in a briefcase. The TEMS 80-03 A microcomputer is built entirely of domestic components and partially of components produced in the other CEMA countries. The basic memory is 1 Kbyte of RAM and 1 Kbyte of EPROM. There is a built-in monitor. The system can be expanded by adding three more memories, another parallel I/O channel, and a serial I/O channel for connecting peripherals with serial communication (CRT display, teletype, etc.). Further expansion of the system by 8, 16 or 48 Kbytes of ROM is being considered.

CSAV Uses Terminal Network

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 12, 1982 pp 478-480 and rear insert

[Article by Engineer Petr Strnad: "Running Jobs on JSEP Computers Through JPR 12 Terminals"]

[Excerpts] The terminal network that the CSAV Computer Center built for the needs of the CSAV work stations in the Prague area is equipped with small intelligent terminals based on the Tesla JPR 12 control computer. The terminal's design was described in an article by Engineer Jiri Poupe in the No 11/1982 issue of this journal. The terminals are connected to an EC 1040 computer at the CSAV Computer Center by means of an EC 8404 communications processor. The design of data transmission in the CSAV's terminal network will be described in a forthcoming article.

Data processing through the terminals is accomplished by means of the TC (terminal control) program that runs on the EC 1040 computer as a regular application. The TC program is able to operate under the OS/EC or the OS/IBM operating system.

1. Processing of Jobs in the Computer

The EC 1040 computer's software support for the terminal network is the TCDATA software package for the creation, maintenance and protection of data files and terminal libraries, and the TC program that controls the operation of the terminals, by means of control commands from the terminal operators. They send the TC program's commands in its command language, from the terminals' displays. The TC program permits processing of the jobs ordered from the terminals in either the batch-processing or the interactive mode. The operator selects the mode of processing at his terminal, by means of the TC program's commands.

1.1 Batch Processing

Batch processing may occur in two ways, depending on which operating system is used. Under OS/EC, the jobs are read in from the terminals into the TC program's input file during a terminal session. When this terminal session ends, a READER program reads the jobs received from the terminals into the computer's input queue, and the jobs are then run in the same manner as the ones read in

by the card reader in the computer room. The only difference is that the outputs of the jobs received from the terminals are directed to the class for output at the terminals. After processing, the outputs of the jobs are rewritten from this class into the TC program's output file. From there (after sorting according to the individual terminals) they are transmitted during the next terminal session to the terminals, while at the same time the new jobs are read into the TC program's input files. The diagram of the data flow under this method of processing is shown in Fig. 1.

When the computer operates under the OS/IBM operating system, in which the HASP [Houston Automatic Spooling Priorities] system for input/output control is generated, everything said above for operation under OS/EC applies. In addition, terminal users have at their disposal also another mode of batch processing. In batch processing under the HASP system, the jobs from the terminals are read directly into the computer's input queue, in the same form as if they were read in by the card reader in the computer room. If the computer completes the jobs during a terminal session, a terminal user is able to print the outputs on his terminal during the same session. The diagram of the data flow in the case of batch processing under the HASP system is shown in Fig. 2.

3. Computer's Load Under Terminl Operation

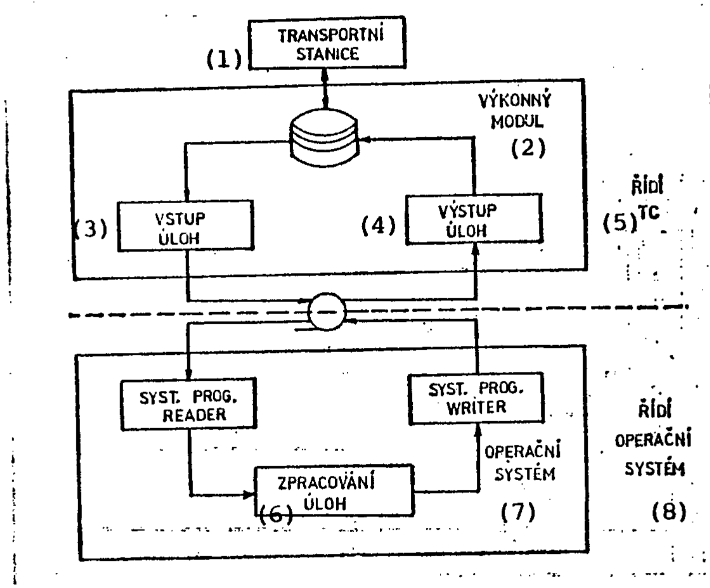
The TC program runs under OS/EC or OS/IBM in the same way as any ordinary applications program. It requires a scratch disk with a capacity of 29 Mbytes, for the individual terminals' user libraries and the scratch files for communication between the terminals and the computer's operating system. To run a TC program that controls eight terminals, 90 Kbytes of main memory are fully adequate.

However, for the greater flexibility of terminal operation, especially when running jobs in the interactive mode, an area of 230 Kbytes is reserved in the the main memory, for the TC program. The resulting reserve in the main memory means that jobs can be run immediately in the terminal's interactive mode, regardless of the momentary situation in the rest of the computer's main memory.

If the reserved main memory is not enough to start a job, the computer's operating systems allocates for the TC program the necessary additional area in main memory, which is again freed when the job has been completed. The CPU's load of communicating with the terminals is practically negligible, because a terminal requires less than a minute of CPU time per hour for two-way data transmission betweenm the terminal and the computer.

4. Experience With the Terminal Network's Operation and the Use of Terminals

At the end of 1981, a total of 16 terminals were operating in the CSAV terminal network connected to an EX 1040 computer, in two waves, always eight terminals over a 3-hour period. Terminal operation gradually became stabilized once the TC program was placed in regular use, becoming a natural part of the computer's daily operation. The computer operators were gradually trained to operate the multiplexer, through whose typewriter they are able to communicate with the terminal operators when the computer is down. The TC program directly accounts



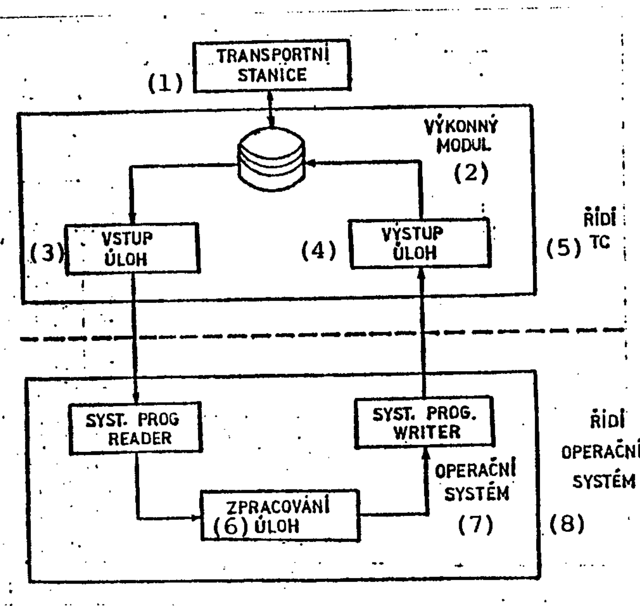


Fig. 1. Batch processing under OS/EC system.

Fig. 2. Batch processing under HASP-OS/IBM system.

Key:

1. Transport station
2. Executive module
3. Jobs input
4. Jobs output
5. Controlled by TC program
6. Job processing
7. Operating system
8. Controlled by operating system

the utilization of the terminals and generates each month a report on the operation and use of the individual terminals. The terminals are used particularly for very efficient program debugging. The use of terminals to directly connect scientific experiments to the computer also is becoming more and more widespread.

5. Further Development of the TC Program

As far as the capabilities offered to terminal users are concerned, development of the TC program has practically ended by now. Further development is expected in the area of the requirements that the PC program places on the computer, and in the area of the terminal network's applications software. An increase of the number of independent program modules, called dynamically by the TC program's nucleus, will permit lowering the requirements regarding the computer's main memory, while simultaneously improving the reliability of the entire TC program.

Data files on the scratch disk are another area for the further development of the TC program. Rewriting some of the auxiliary routines should reduce the number of data files needed, and thereby also the requirements regarding the available capacity of the scratch disk.

Microprocessors on Paper Cutters

Prague MECHANIZACE A AUTOMATIZACE ADMINISTRATIVY in Czech No 12, 1982 back insert

[Text] Microprocessors have become parts of the paper cutters that the Adast [Adamov Engineering Works] Concern Enterprise of Adamov is building for the printing industry. The enterprise has used microprocessors on paper-cutter models MS 80 and MS 115 Maxit-1.

While the first model is equipped with a small microprocessor program and functions semiautomatically, the second model is fully automatic. Both have provisions for adding external memories, with a wide range of program variants. On a cassette recorder, one of the accessories, the user is able to prepare a so-called bank of programs for the entire coming period.

A new product in Adast's traditional line is the MM 58-2 cutter. Its blade is driven by a single-phase motor, which not only saves electricity but makes for safer operation. The MS-80 industrial cutter, for cutting cardboard, paper, cork and other technical materials, is less noisy and has a higher output power. A special transparent shield reduces industrial accidents.

1014
CSO: 8112/1085-A-D

CENTRAL WELDING INSTITUTE DESCRIBED

East Berlin NEUE ZEIT in German 13 Mar 84 p 5

[Unattributed article]

[Text] The Central Institute for Welding Technology Halle (ZIS) has in the more than 30 years of its existence developed more than 1000 new instruments, welding rods, and auxiliary material. In a license catalog the Institute offers, among others, new developments in welding machines and -robots based on modular construction, and in specialized welding machines for customers at home and abroad.

As ZIS patent engineer Gerhard Kuenzel announced, the ZIS 650 building block units can be used to construct, entirely or in part, welding machines for almost all existing production methods. These units can be put together by the user and can be augmented with additional automated units according to the individual task. This method saves development and operations costs.

Similarly the standardized assortment of ZIS 995 units can be used to construct robots for resistance and arc welding. The building blocks include six translating, two rotating parts and a turn table, which permits positioning of the welded part into the correct position. The ZIS 955 robots are completely programmable, and cover-based on installed accessories-controlled distances between 100 and 6300 millimeters. The shape of the worked part, the location of the welding seams, and technologically determined degrees of freedom determine selection and arrangement of the modular units. Robots can in this manner be tailored to a specific tool for mass production. Spot welding robots usually require three to four degrees of freedom. Arc welding robots in most cases must cover complicated welding seams and require at least five degrees of freedom. Robots can be rearranged easily and quickly to accomodate different product runs in small quantities.

The ZIS Halle is also the technological center for special welding methods in the GDR. There are at present over 30 laser welding and cutting installations, six electron beam and 20 plasma welding installations in the GDR. Electron beam welding, for instance, is used in the heavy machine industry, in transmission fabrication, in machine tool construction and in the instrument industry. Experts of the Institute are developing needed technologies for all applications with the help of a microprocessor controlled ESA 150/50 MR installation, which was developed at the Manfred von Ardenne Research Institute.

7994
CSO: 2302/45

LINKING A DATABASE MANAGEMENT SYSTEM INTO A COMPUTER NETWORK

Budapest INFORMACIO ELEKTRONIKA in Hungarian No 1, 1984 pp 9-17

[Article by Peter Bekessy and Imre Szalay, of the Computer Technology Applications Enterprise; received for publication 17 May 1983]

[Author's Summary] The article describes the linking of the NSS (Network Service Support) network software and the DMS 60 database management system providing some of the guidance functions into a computer network, as part of the development of the VIDEOTON production guidance system. It offers a brief review of the structure of the NSS and the DMS 60 and then describes the plan and realization of the coupling and experiences acquired in the course of this.

[Excerpts] Introduction

Development of the VIDEOTON production guidance system with a computer network realized on its own computers has been underway for years (the Videoton Network System, VNS). To solve the task the Remote Processing Main Department of SZAMKI [Computer Technology Research Institute], in cooperation with VIDEOTON, created packet switching network software, the NSS (Network Service Support), for an ESZ 1010M (VT 60) computer. VIDEOTON developed the production guidance functions (order record keeping, inventory record keeping, etc.) based on a transaction oriented database management system, the DMS 60 (Data Management System). Our task was to couple the NSS and the DMS 60 on both the ESZ 1010 and ESZ 1010M computers.

In the following we will speak briefly about the NSS network, the DMS 60 system and the principles for and realization of linking them, and will describe the experiences acquired in the course of the work. We will try to make the large amount of information clear with diagrams. The expansion of the abbreviations which can be found in the text--to facilitate reading--are summarized in a table which we provide at the end of the article.

The NSS Network

An overview of the system is shown in figure 1; this is the version used in an operational test of the VNS. The configuration consisted of three node computers and three computers containing the user databases. Every node computer, between which communication is realized on synchronous lines, is an ESZ

1010M; two of the computers running the user systems are ESZ 1010 models and one is an ESZ 1010M. The user systems developed by workers from VIDEOTON are the following:

RAKALL--inventory records,

RAIR--production guidance, and

TEKAB--product catalog.

We will describe only the chief characteristics of the NSS network. Further information can be obtained from the author's documentation and from articles 1, 2, 3 and 4.

The NSS is a message packet switching network made up of software layers following in principle the international standards (ISO/OSI open system architecture).

Figure 2 shows the internal structure of the logical components and figure 3 shows their functional design. The task of the physical control level is control of the hardware interface; the Link Control (LC) layer is based on this; its function is error-free data transfer between node computers. The Network Control (NC) layer creates so-called virtual paths between the contact points (ports) to be linked. The Transport Control (TC) layer provides control of the information flow. The Session Control (SC) layer is linked directly with the user systems and its task is to establish, maintain, break and record the links between them.

The layers mentioned thus far constitute the nucleus of the network and realize those services which the couplings can use. From the viewpoint of the network the terminals are couplings also. The Virtual Terminal Control (VTC) layer links a virtual terminal to the network, on the one hand, and on the other breaks this down to functions of a concretely connected terminal. A rules system (protocol), the Virtual Terminal Protocol (VTP), determines the content of the packets, with a useful length of 128 bytes, being passed in the network. The program systems using the NSS do not run on the node computers realizing the network but rather run on the so-called resource (host) computers. The Host Applications Manager (HAM) layer controls the link between node and resource computer. Physical data transfer is realized via a channel-channel adapter (AMC) with a speed of 100 K words per second.

Let us mention again the factors determining the coupling from the direction of the NSS. The part of the HAM going into the resource computer represents the direct interface; the application is connected with this. The SC layer determines the rules for traffic. The packet contents must be compiled according to the syntactic and semantic rules of the VTP.

The DMS 60 Database Management System

The user's handbooks (8) and the guides (5 and 6) provide a detailed description of the DMS 60 being traded by VIDEOTON. We will now summarize only briefly what is most important about this software system which runs on the ESZ 1010 and ESZ 1010M minicomputers.

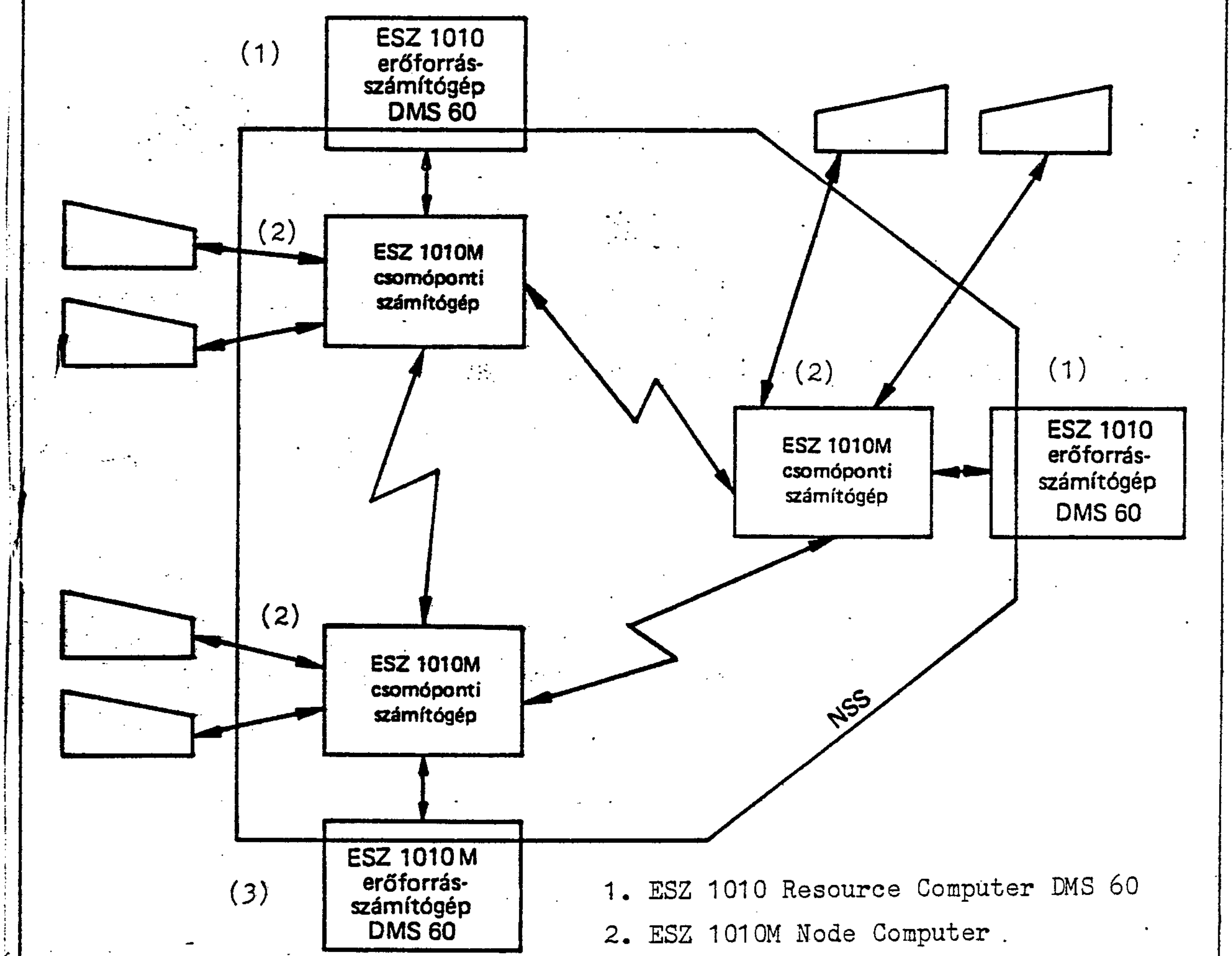
The DMS 60 is a database management system working with a CODASYL type net data model. Users working on terminals in the on-line mode can keep the database constantly up-to-date.

It has three independent languages. In the data description language we can define the structure and linkages of the database records and their location on the data carrier. The transaction language serves to describe user transactions, by initiating macros to determine screen format and to query the database. The macro language is the tool for modification of the database. One can initiatie a macro language command series from a transaction but ad hoc queries and modification can be done in the macro language also.

The DMS 60 also provides data security (journal, correction) and data protection (one can define what transactions can be initiated from what terminals) services, which are indispensable in on-line-initiation and multiuser systems.

The structure of the DMS 60 system is shown in figure 4. Since this is a complex large program system modifications are limited to the programs of the data collection subsystem, leaving the operation of the rest of the system unchanged.

Figure 1.



1. ESZ 1010 Resource Computer DMS 60
2. ESZ 1010M Node Computer
3. ESZ 1010M Resource Computer DMS 60

References: 6 Hungarian

8984
CSO: 2502/38

DBS/R-3, A DATABASE MANAGEMENT SYSTEM WITH A FURTHER DEVELOPED INTERNAL DATA MODEL AND A HIGH LEVEL PARALLEL TASK SOLUTION POSSIBILITY

Budapest INFORMACIO ELEKTRONIKA in Hungarian No 1, 1984 pp 18-22

[Article by Peter Krah, of Robotron, Dresden; from a publication describing the proceedings of an international seminar on architecture of database management systems, 6-10 December 1982, Kotobrzeg, Poland; received for publication 23 Jun 1983]

[Author's Summary] The DBS/R-3 system was developed in the interest of the completeness of database management systems, to make their use economical. In contrast to the earlier DBS/R-2 system, storage and methods of access were improved in the DBS/R-3, making it more economical to store information in any applications field of the database. A new element of the DBS/R-3 is monitor control, which ensures a high degree of efficiency for parallel task solution. The system is suitable for individual use or for very large database systems with several hundred terminals.

[Excerpts] A research group of the Robotron Combine developed the DBS/R-3 database management system. The purpose of this software product is to create and maintain databases in various applications areas. The plan was based on experience acquired in the course of use of the earlier DBS/R-2 system (1). It was demonstrated with several hundred applications that such a system:

--makes it possible to maintain and query large volumes of data automatically,

--makes it possible even for those inexperienced in electronic data processing to access the database directly,

--solves the chief problem of traditional electronic data processing in that it loosens the rigid link between data and program.

When designing the DBS/R-3 the results of database research thus far were taken into consideration. The so-called monitor control for DBS/R-3, especially, was designed in large measure according to the recommendations published in (2) and (3).

The chief goal in the development of DBS/R-3 was economy of use. This extends to planning, programming and useful applications alike. In structure and user functions the system is similar to DBS/R-2, but a few of its properites differ:

--The DBS/R-3 includes a new data description. The database is described with freely formed instructions. In contrast to DBS/R-2 the use here is much more convenient and one can save time when describing the data.

--The DBS/R-2 file model was retained, but the organization of the files which can be accessed differs from the IS or VSAM organization with the B* organization. A paging method took the place of the blocked storage method used thus far.

--The basic mode of operation is a multi-task one; parallel access to the database is possible. The DBS/R-3 can work simultaneously in the batched and remote processing mode. Data communication is realized via an ESY/R-3 working together with the DC system. The conversational mode is realized by using the DBS/R-3 and the TSO.

--Data protection is very efficient in the DBS/R-3 system. Together with step by step correction this ensures the consistency of the database under all imaginable circumatances. Restoration can take place in minutes after failure of the system.

This article describes the physical data structure and priority control, since these are the areas where the system differs most from the DBS/R-2.

References: 1 East German, 2 West German, 2 in English. References 2 and 3, cited as the basis for the DBS/R-3 monitor control are: J. N. Gray et al: "Granularity of Locks and Degrees of Consistency in a Large Shared Database" in "Modeling in Database Systems," North Holland Publishing Corp., 1976, pp 365-394; and Th. Harder: "Implementierung von Datenbank-Systemen," Carl Hauser Verlag, Munich-Vienna, 1978.

8984
CSO: 2502/38

DIRECT CONNECTING BANDS FOR PRINTED CIRCUITS

Budapest FINOMMECHANIKA, MIKROTECHNIKA in Hungarian No 11, 1983 pp 350-353

[Advertisement for KONTAKTA, Budapest, by Laszlo Bodnar]

[Text] The manufacturers of equipment and apparatus use connecting bands suitable for both direct and indirect connection to solve connection problems for printed circuit cards. The nature of the task and technical and economic considerations determine which design will be used in the given case.

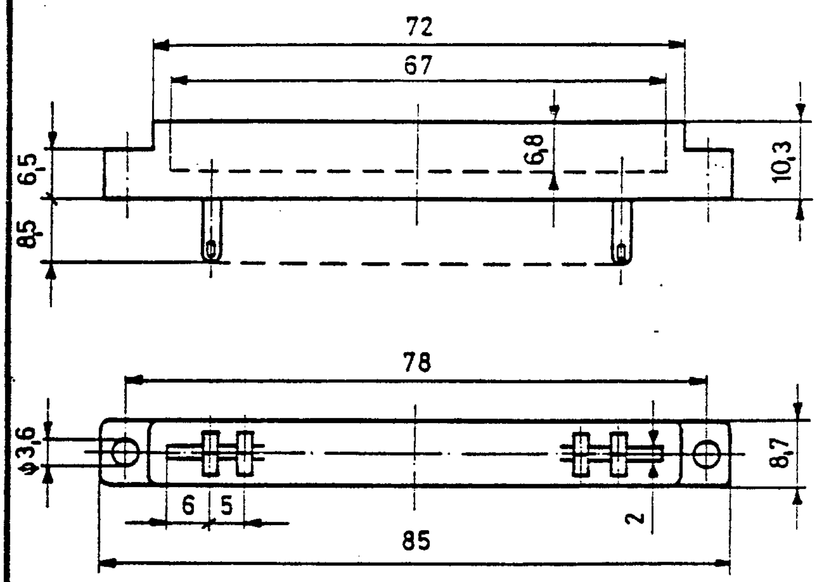
KONTAKTA--taking into consideration the needs of users--manufactures various versions of connecting bands for direct connection of printed circuit boards. We will describe below the connecting bands now being sold or which can be ordered making it possible to compare the technical data and select the type best suited for the purpose.

The technical parameters and other characteristic data (pole number, thickness of card which can be used, method of connection, etc.) are contained in tables.

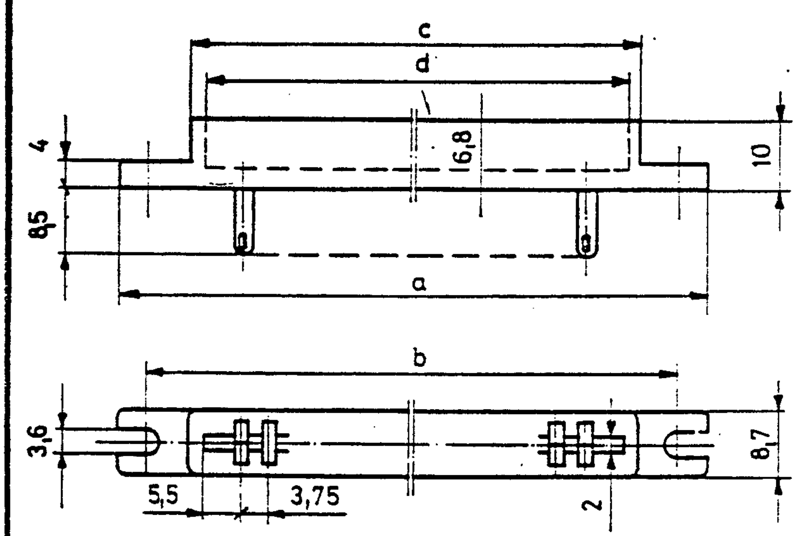
Single Line Direct Connecting Bands DS 1511 and DS 1521

In the DS 1511 type the contact surface is silvered or gold plated; in the DS 1521 it is gold plated.

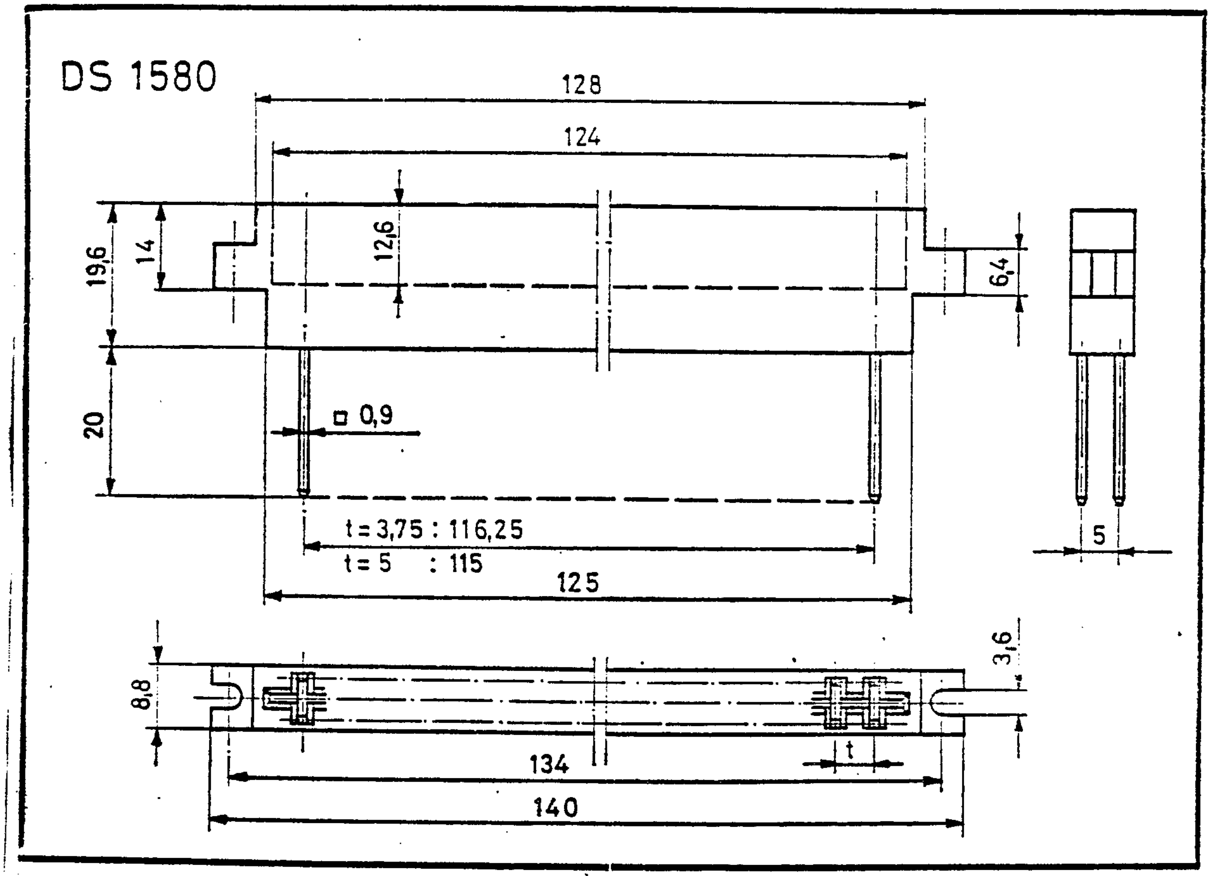
DS 1511



DS 1521



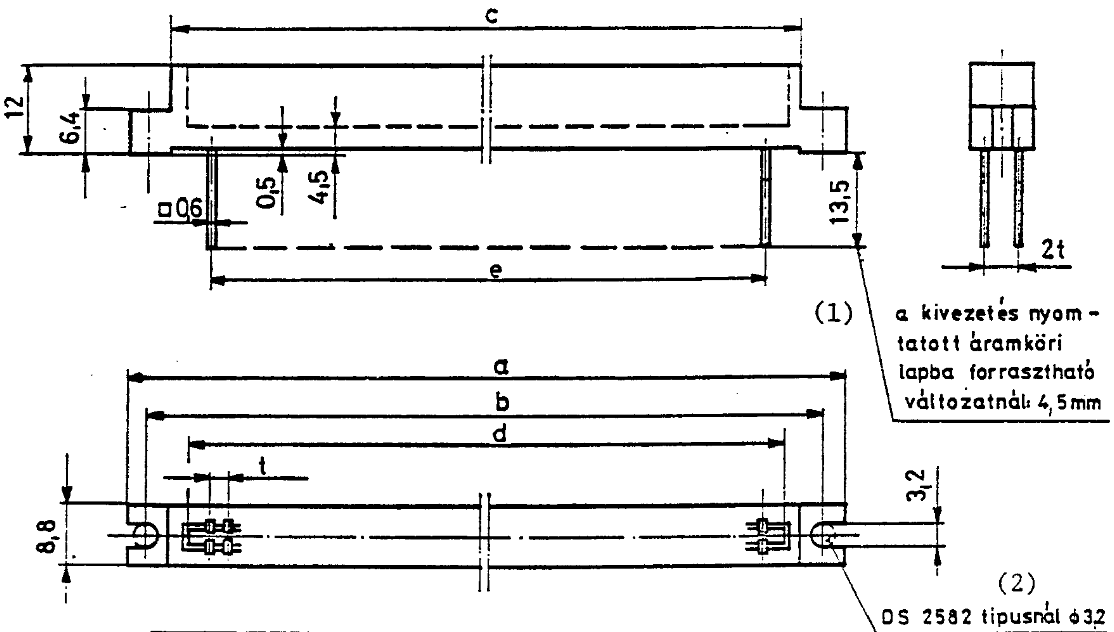
Pólusszám	a	b	c	d
12	75	67	56	52,4
20	105	97	86	82,4



Double Line Direct Connecting Bands DS 1580

The insulating body of the connecting band is made of synthetic material which hardens under heat. Coding can be provided with a "T" shaped element. The surface providing the contact is gold plated, zinc on the leads.

DS 2581 ; DS 2582



(3)

Tipusjel	t	a	b	c	d	e
DS 2581-296-5	2,5	140	134	128	124	117,5
DS 2582-296-5	2,54	142,6	135,6	128,3	124,3	119,4

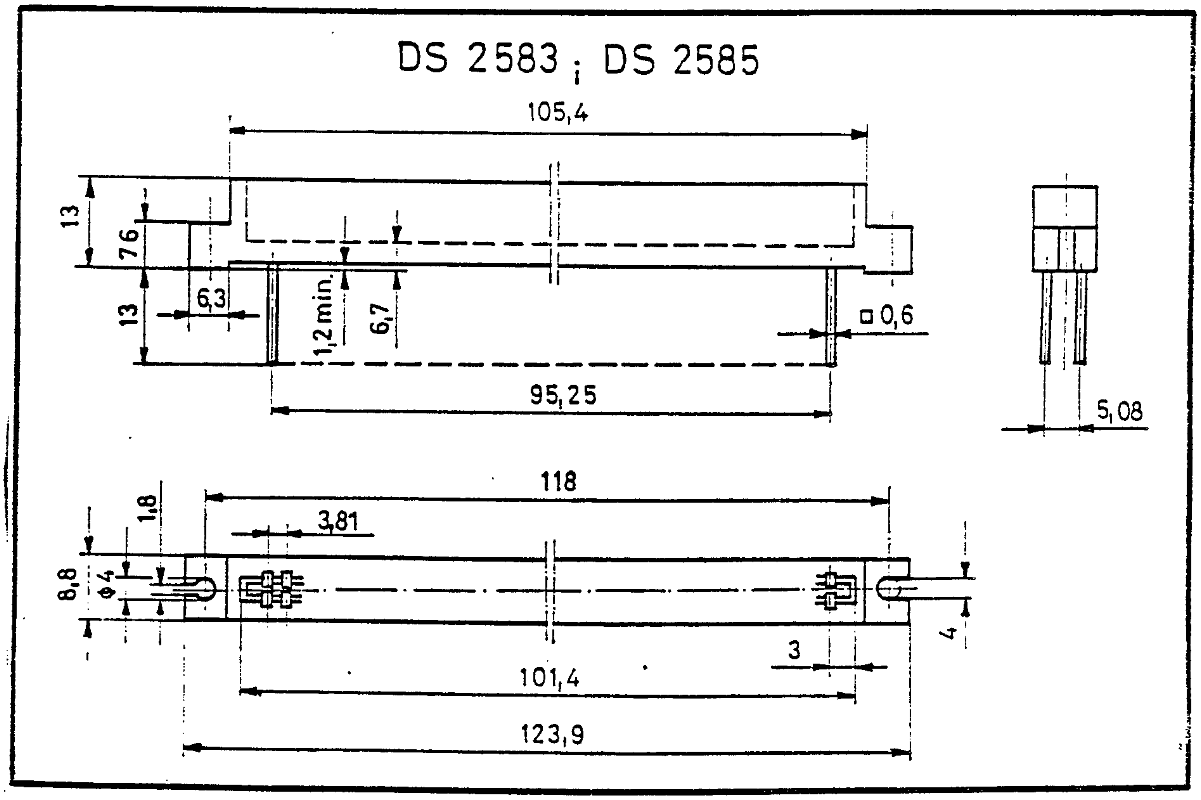
Key:

1. 4.5 mm for the version in which the leads can be soldered to the printed circuit board
2. 3.2 for the DS 2582 type
3. Type designator

DS 2581 and DS 2582

The insulating body of both connecting bands is made of a synthetic which softens under heat, in versions with a maximum of 96 poles. The design is such that one can form versions with fewer poles, but with a paired number of poles, as desired by cutting the connecting band and using the end piece.

These also can be coded with a "T" shaped coding element. The surface of the contacts is gold plated.



DS 2583 and DS 2585

The insulating body is made of synthetic material which softens under heat or which hardens under heat.

The connecting bands can be coded with a "T" shaped element. The surface of the contacts is gold plated.

The diagrams show outline drawings of the connecting bands described.

We inform interested experts that our technical development main department is at their disposal to answer technical questions concerning our products. (Telephone: 270-200/121)

Műszaki paraméterek (2)	DS Csatlakozósáv tipusok nyomtatott áramkörökhöz (1)						
	DS 1511	DS 1521	DS 1580	DS 2581	DS 2582	DS 2583	DS 2585
Névleges feszültség [Veff] (3)	350	250	350	250	250	250	250
Névleges áramerősség [A] (4)	2	2	7,5 ; 6	3	3	3	3
Átmeneti ellenállás [mohm] (5)	max.10	max.10	max.10	max.10	max.10	max.10	max.10
Szigetelési ellenállás [Gohm] (6)	min.10	min.10	min.10	min.10	min.10	min.10	min.10
Csatlakoztatási erő érintkezőpáronként [N] (7)	max.36	max.36 (12 pólus) max.60 (20 pólus)	max.96	max.130	max.130	max.130	max.130
Bontási erő érintkezőpáronként [N] (8)	min.6	min.6 (12 pólus) min.10 (20 pólus)	12 - 54	min.30	min.30	min.30	min.30
Mechanikai élettartam csatl. ciklus (9)	600	600	100	500	500	500	500
Környezetállósági kulcsszám (10)	25/070/21	40/085/56	55/125/56	40/085/56	40/085/56	55/75/56	55/85/56

Tipusszám (11)	Pólusszám (12)	Osztástávolság [mm] (13)	Kártyavastagság [mm] (14)	Bekötési mód (15)	Vonatkozó szabvány (16)
DS 1511	1 x 12	5	1,4 - 1,8	forrasztás (17)	
DS 1251	1 x 12 ; 1 x 20	3,75	1,4 - 1,8	forrasztás (17)	MSz05-61.6422
DS 1580	2 x 24	5	1,36 - 1,8	wire-wrap	KÜSZ 110
DS 2581	max. 2 x 48	2,5	1,36 - 1,8	wire-wrap, kártyába forr. (18)	KÜSZ 109
DS 2582	max. 2 x 48	2,54	1,36 - 1,8	wire-wrap, kártyába forr. (18)	KÜSZ 109
DS 2583	2 x 26	3,81	1,36 - 1,8	wire-wrap	KÜSZ 116
DS 2585	2 x 26	3,81	1,36 - 1,8	wire-wrap	

[Key on following page]

Key:

1. DS connecting band types for printed circuits
2. Technical parameters
3. Nominal voltage
4. Nominal current strength
5. Transient resistance
6. Insulation resistance
7. Connection strength by contact pair
8. Break strength by contact pair
9. Mechanical life connection cycle
10. Environmental tolerance key
11. Type number
12. Pole number
13. Spacing distance
14. Card thickness
15. Connection method
16. Pertinent standard
17. Soldered
18. Wire-wrap, soldered to card

8984
CSO: 2502/40

MYTHS VERSUS REALITIES OF ELECTRONICS INDUSTRY DISCUSSED

Budapest HETIVIALAGGAZDASAG in Hungarian 7 Apr 84 pp 34-36

[Article by Zoltan Tompe: "Electronic Industry: Myth Struggle"]

[Text] At one time the machine was the helper of man. With the development of large industry the man became the helper of the machine. Now we are at a stage where the man is the supervisor of the machine; and microelectronics is leading us to the fourth stage, where the machine is the supervisor of the man. This is the thesis of the author of our article below, an engineer-economist, concerning certain obstacles to the development of the domestic electronics industry. He calls the method of the destruction of myths to his aid in his pragmatic analysis.

It is hardly possible to characterize with a single number of years the lag of the Hungarian electronics industry behind that of the developed capitalist countries. There are a few individual export products of domestic manufacture which represented the leading average technology 3-5 years ago, and there are electronic devices and services here at home for which the lag is more than 30 years. Speaking of electronics experts generally speak of an average lag of about 10 years; but this applies only to the electronic products themselves. In the area of use, in the electronics culture, the gap is larger than this. In addition the number of years is misleading, because it suggests that we are progressing on the same path as those who went before us and that it is only a question of time before we reach the same level. But there is no sort of automatic guarantee of this. It is relatively easy to catch up in regard to concrete electronic devices. But narrowing the gap is much more difficult in services, in the economic and social role of electronics, in the social prestige of electronics experts; and even reducing the rate at which the gap is growing is no small task.

In my opinion the most important of the reasons for the lag are the economic ones. For a long time domestic economic policy forced electronics, primarily computer technology and recreational electronics therein, into the background. Even today we have not found that economic mechanism which would increase the flexibility and adaptability of the economy, for a swift takeover of modern technology. It well indicates our backwardness that in Hungary the per capita "consumption" of electronics is about 40-50 dollars per year, about half the world average.

One concrete cause of our backwardness, of our inability to compete, is that the domestic electronics industry production costs are extraordinarily expensive. On an average the Hungarian manufacturers of electronic end products get materials and parts for nearly double what their capitalist competitors pay. The price of electronic parts produced in the socialist countries is 1.8 to 2.3 times the world market average, and domestic parts are often even more expensive than this. The import of capitalist parts is hardly possible; a high duty burdens the few parts imported. A manufacturer of electronic end products finds that he must pay 80-100 forints for one dollar's worth of parts from capitalist import, while we demand that he produce one dollar's worth of end products from 40-50 forints. The cost increasing effect of central administration, of business and administration is well known also.

It will cast light on the background of our noncompetitive production prices if we disperse a few myths. It is not possible here to put every legend living in public awareness under the knife. One of the most important of them is the legend of cheap Hungarian labor. I am convinced that Hungarian labor is not cheap; rather, Hungarian wages are low. In the electronics industry the workers, technicians and engineers of developed capitalist competing firms, people with the same level of training, get gross pay (thus subject to income tax) which is higher than that of their Hungarian colleagues by an order of magnitude. But this difference does not appear in the price ratios of the end products. As a result of the substantially worse efficiency, the lower technological level and weaker operations and work organization the potential advantage deriving from the lower domestic wages completely disappears; indeed, the average wage costs per product are greater for us.

It is a little far from electronics but perhaps the example is illustrative. Let us presume that in a tenpins factory a single lathe replaces 100 men with knives and rasps. The pins coming from the lathe will be much more precise and cheaper than those of the men with knives, for however low a wage we hire them. In addition, here, if the factory finally buys a lathe the men with knives keep their jobs, and we have to hire a new man to handle the new technology. The coexistence of technologies of various epochs and gigantic numbers of extra personnel burden the low wages.

I call the following widespread erroneous belief the Hong Kong myth. We can witness heated pseudo debates in professional circles about whether Hungary can assume the role of Hong Kong on the basis of the "cheap" Hungarian labor, that is do "humiliating" capitalist jobwork, manufacturing large series of medium quality, cheap products. But already, in international relationships, wages account for only 2-5 percent in the price of the most modern electronic products. Automation has reached such a level that technology is much more important than the price of manpower. The import of capital and the ability to quickly adapt modern technology are behind the success of Hong Kong and its swiftly developing southeast Asia fellows. And even in these countries wages are not so legandarily low.

The third is the development myth. The developed western electronics firms are offering ever more varied services with ever more modern equipment at ever lower prices. The characteristic reaction of domestic enterprises goes like this--The customer should pay for the extra service, for the greater performance. Here a new development is very frequently accompanied by a price increase, although most often costs should decrease for a new, modern, lighter, energy saving device. Hungarian enterprises like to use the very significant sums intended for technical development for communal purposes to keep workers or for wage supplements in kind to lure workers. If it is not possible to increase wages because of central restrictions then at least they try to keep their workers with nurseries, resorts and housing construction support financed from the technical development fund. In general a small part of the technical development money goes to the modernization of producing equipment. Every single domestic electronics enterprise maintains an extensive developmental apparatus, because then they can calculate significant sums in their prices under the heading of technical development. Thus a large, slow, inflexible and expensive developmental organization has been created for virtually every enterprise.

Fourth is the myth of profit interest. The western competitors have much greater freedom in dividing up their profit than the domestic enterprises do. Capitalist enterprises sometimes turn 30-35 percent of the profit to material incentive, shares or wage increases while the shares at Hungarian enterprises average 3-5 percent of the profit. Together with credits assumed on the basis of profit the capitalist firm can spend 200-300 percent of the profit on development, on new investment. In Hungary a maximum of one quarter of the profit can remain at the enterprise for developmental purposes. In Hungary the material source for technical modernization within the enterprise is not the profit but rather the technical development, calculated as a cost. In the final analysis profit is important for a Hungarian enterprise too, but primarily because of the external judgment, a good name and preferences and not because of its economic essence--profit is merely a beauty spot, not a basic condition for surival. In place of profit the primary interest of domestic enterprises is to maintain the domestic and socialist shortage markets, guaranteed by the import stop and without real competition.

Naturally we cannot say that nothing has been done in the interest of the development of our electronics industry. Since the beginning of the 1970's 25 plans have been prepared for the reconstruction of the electronic parts manufacturing industry. Finally, in December 1981, the Council of Minister accepted the 25th plan.

This accepted government program for microelectronics was formulated amidst world market, financial and economic conditions a good bit less favorable than for the earlier drafts and its goals were more modest accordingly. The electronics industry of every country needs stressed government programs, central development plans; this is natural. But in my opinion the problems of Hungarian electronics are not primarily technical but rather economic questions. It reflects a bad view if the experts debate

only about how this should be developed and not that, that so much and not this much should be allotted. The central programs themselves must be supplemented by an economic mechanism which encourages adaptivity. The economic mechanism must be developed so that the economy (and the electronics enterprises therein) should be capable of swift, flexible accommodation, the takeover of new techniques and new technologies and their creative integration.

An analysis of the present situation permits the conclusion that in the 1980's the lag of the Hungarian electronics industry behind the world front rank will increase even further. The earlier economic policy and mechanism errors and especially the material and moral undervaluation of the technical intelligentsia will make their effect felt for a long time. It is very difficult to correct the errors, change step and make up for lost time. Even in the best case we may catch up in the second half of the 1990's, in the last years of the millenium.

On the basis of all this some may conclude that it is hopeless for our electronics industry to catch up, that it would be better to seek another focal point for innovation in our economy. But we have no choice; electronics must be used, the technology must be mastered and be made an organic part of our life. Naturally there is no sense in planning an independent domestic electronics manufacturing vertical structure, competing with Japan and the United States. But there are not only mammoth firms on the world market. Small firms and small countries too can integrate into the world electronics market with selective development, flexibility and good quality. Even with the backwardness of the average of Hungarian electronics one can select a few special areas which will give hope and a starting point for the future--in an economic environment capable of swift, flexible adaptation, and only in such an environment.

8984
CSO: 2502/52

SUCCESS OF MICROPROCESSOR TECHNOLOGY EXPLAINED

Budapest MAGYAR HIREK in Hungarian 29 Apr 84 p 8

[Article by Erika Zador: "No Man Is a Prophet"]

[Text] The Hungarian industry buys few licenses, and even when it does the purchase is made abroad. A national license that is used by domestic companies is extremely rare. No man is a prophet in his own country... But, so it seems, there still are a few prophets. At the beginning of April, the companies using the MMT system held a conference, where, in addition to the owners of the license, the staff members of about 20 companies using the license also participated together with representatives of companies interested in using the license.

What is MMT and why the interest in it? This is the question I asked Dr Erno Kiss, Director of MMT User Association.

[Answer] MMT [Medicor Microprocessor Technology] is a complete system, which facilitates the use of microprocessors in many areas of technology. The application of the system allows the relatively rapid development of automated equipment and experiments. MMT includes tools--hardware--as prefabricated cards. It also includes mental investment--software--with which the tools can be activated and used. Equally important is that it has rather complex equipment which assists the design engineers and permits the testing of the functions of microprocessor equipped tools.

[Question] What can the purchaser of the license buy "ready-made" and what must he develop on his own?

[Answer] The system is based on the fact that all microprocessor equipped equipment includes "standard" units performing identical functions. Such are, for example, processors themselves, various printers, memories, connecting busses and special junction boxes. At present, 53 different cards can be purchased in the MMT system. When designing a specific system the design engineer of the company needs to develop only those special units which translate the locally produced signals into the language of the computer, the microprocessor.

[Question] Could you give us an example?

[Answer] Texelectro implemented the central heating regulator and plant controller system of the Debrecen Nuclear Research Institute using MMT. The Kobanya Pharmaceutical Factory also employed this technology to develop the automatic measurement device, which can be used to perform complicated physiological examinations, involving the stimuli of laboratory animals, the evaluation of their reaction to reward by food or punishment by electric shock. Obviously, in the first application, "the sensors" of the microprocessor must sense the changes in temperature and regulate the heat as a response, while in the second, the input signals are the movements of the animals and the EEG signals characteristic of their behavior. The output is the measurement notebook and the stimuli fed to the animals. Besides the special equipment, there are many similar cards, and even certain portions of the programs controlling them are similar.

The system was developed by the Measurement Faculty of the Budapest Technical University, contracted by Medicor. The original task was to develop the electronics of automatic hematological blood tester at the university, in cooperation with GDR. The researchers performed the task in such a manner that the automation of not only one device resulted, but rather a method that Medicor itself used for the development of 30 devices, which about 20 companies have purchased so far.

The development of MMT cost about 100 million forints and required 90 man years of engineering. However, its application already has resulted in much greater savings, which is very significant. First of all, our country is behind in the area of microprocessor applications and production of finished products containing such devices. No company can afford long developmental work which goes on for years. Based on experience a development project starting from zero, i.e. requiring a designer to develop every unit on his own, takes 5 to 10 years. This can be completed in one to one and a half years with the use of the MMT system. Second, technical development requires a developmental capacity, which exceeds a "critical volume." This critical volume is much smaller when the system is used, and thus many more companies are offered the opportunity to develop microprocessor equipped devices. It would be totally redundant "to invent" hot water everywhere. Fortunately the companies also recognize this, it is proven by the unusually large number of license purchases and the establishment of the MMT Applications Association, which is also supported by the Ministry of Industry and the OMFB [National Technical Development Committee]. Medicor made the largest contribution to the Association, but significant sums are provided by the Radelkis Cooperative, VBKM [Electrical Equipment and Appliance Work], the Kobanya Pharmaceutical Factory, Texelektro and Metripond Scale Factory. University research associates also participate.

[Question] What is the charter of the Association?

[Answer] The most important task is to eliminate redundant effort. Our tasks include many such activities, which would have to be undertaken separately by each individual company. Such an activity is, for example, training, which has the primary task of training the experts of the companies. A similar task is the preparation of documentation necessary for application. We are assisting the manufacturers in the preparation of test

programs to improve the reliability of products, since this is one of the most important yet most neglected aspects of production. Because in this application it is not possible to simply measure currents and voltages, but rather the entire complicated system must be tested during operation. And a million signals may be generated in one second.

Within the framework of the MMT system, the member companies manufacture the development and control equipment and the MOD 81 intelligent measurement data collection device. This can also be conveniently used in the development project and 120 to 150 pieces of this are produced. Approximately 6,000 cards are manufactured and volumes of documentation are delivered to the users. Until now--as indicated by MMT users at the technical conference held early April--goods worth 500 million forints were manufactured as a result of the development that took place thanks to technology. And these products are of such high quality that they can be sold on any markets.

As pointed out by the director of Medicor, there is interest in the technology also on the Soviet market. There is a real possibility that the Soviet medical instrument industry can use the system itself as well as the associated hardware and measuring and testing devices. This could be very significant. The domestic users of the MMT system already enjoy the benefits of standardization: their devices are not only quicker to build but can also be repaired easier. If such a system could be spread in the COMECON countries, the work of developers would be facilitated to a large degree and their cooperation in the spreading of microprocessor applications enhanced, without which today neither modern products nor modern production processes can be imagined.

9901
CSO: 2502/56

ISOTOPE MEDICAL DIAGNOSTIC INSTRUMENTS OF THE GAMMA WORKS

Budapest MERES ES AUTOMATIKA in Hungarian No 12, 1983 pp 443-447

[Article by Dr Adam Billing, Jozsef Halpert, Bela Kari and Gyorgy Margitfalvy, of the Gamma Works, Budapest: "Isotope Medical Diagnostic Instruments of the Gamma Works Based on the MMT System"]

[Authors' Summary] The article describes the activity of the Gamma Works in nuclear diagnostics and a new nuclear instrument family under development based on the MMT [micro-module] system. It describes in more detail the first member of the family, a one or two channel energy selective counter.

8984
CSO: 2502/42

A NO-CONTACT MEASURING METHOD FOR CARDIOLOGICAL EXAMINATIONS

Budapest MERES ES AUTOMATIKA in Hungarian No 12, 1983 pp 452-457

[Article by Tran Quang Hung, MEDICOR Works Developmental Institute, Budapest: "A No-Contact Measuring Method for Cardiological Examinations"]

[Author's Summary] We describe a no-contact measurement method for dynamic cardiological examinations. During the measurement there is no direct mechanical contact between the measurement head and the object to be measured. Since the method is entirely noninvasive and the measurement system does not burden the patient its use is spreading in medical techniques. The article summarizes the basic questions of the method and gives an example of its application.

8984
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DESIGN ASPECTS OF THE SETOR DISTRIBUTED DATABASE MANAGEMENT SYSTEM

Budapest INFORMACIO ELEKTRONIKA in Hungarian No 1, 1984 pp 3-8

[Article by J. Mihaylov, R. Khristov and P. Dishlieva, of INTERPROGRAMMA, Sofiya; from a publication describing the proceedings of an international seminar on architecture of database management systems, 6-10 December 1982, Kotobrzeg, Poland; received for publication 23 May 1983]

[Author's Summary] The purpose of the article is to analyze a few design aspects of the SETOR distributed database management system. It outlines the architecture and chief capabilities of the system. It describes the rules for distribution and localization of data. It reports on recovery procedures based on partially synchronized and unsynchronized checkpoints. It reviews mechanisms providing control of parallel data management. The SETOR D-DBMS project is in the first phase of planning; the first version of a functioning system will probably be available by the end of 1983.

References: 1 Bulgarian, 1 Russian and 10 in English.

8984
CSO: 2502/38

EXPERIENCES IN PHYSICAL DATABASE DESIGN

Budapest INFORMACIO ELEKTRONIKA in Hungarian No 1, 1984 pp 23-27

[Article by Gyorgy Gal and Ilona Papp, of the Laszlo Kalmar Cybernetics Laboratory, Attila Jozsef Science University; received for publication 24 Aug 1983]

[Author's Summary] The article summarizes experiences with physical database design acquired in the course of using an IDMS database management system. By analyzing a concrete task it is shown how the specifics of the task, the requirements of operation to be expected and the nature of the hardware/software environment available affect the development of an IDMS logical and physical database in the process of designing a database system. New, special storage and access methods based on the basic storage and access modes offered by IDMS are described.

References: 2 in English, 1 Hungarian.

8984
CSO: 2502/38

LIMITS AND POSSIBILITIES IN MODELING SYSTEMS

Budapest HIRADASTECHNIKA in Hungarian No 12, 1983 pp 571-574

[Article by Dr Arpad Csurgay, Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences: "Limits and Possibilities in Modeling Systems," a talk given at the 2 May 1983 scientific session of the Hungarian Academy of Sciences]

[Author's Summary] The author discusses in a comprehensive system the possibilities and limits of analysis via modeling. He also analyses the possibilities of a solution via the linking of systems and subsystems and by this path comes to applications of computer assisted design systems.

8984
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CONTROL METHODS FOR DATA NETWORKS

Budapest HIRADASTECHNIKA in Hungarian No 12, 1983 pp 579-582

[Article by Dr Laszlo Csaba, Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences: "Control Methods for Data Networks," a talk given at the 2 May 1983 scientific session of the Hungarian Academy of Sciences]

[Author's Summary] The Reference Model established as a result of the standardization work under the heading of Open Systems Interconnections (OSI) makes possible a classification of control procedures for data transmission networks and a brief introduction to a few characteristic procedures.

8984
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CALCULATING THE THERMAL DISPERSION OF IC CHIPS

Budapest FINOMMECHANIKA, MIKROTECHNIKA in Hungarian No 11, 1983 pp 321-324

[Article by Dr Vladimir Szekely, Electronic Devices Faculty of the Budapest Technical University, and Tamas Sziranyi, VIDEOTON Developmental Institute: "Calculating the Thermal Dispersion of IC Chips"]

[Authors' Summary] Thermic modeling is receiving an ever more important role in the design of integrated circuits. The computer program described in the article takes into consideration the heat conducting effect of encapsulation and wiring and calculates the thermal dispersion of the IC chips. The simulation is based on a fast Fourier cosine calculation procedure. We take the heat conducting effect of the environment of the IC chip into consideration with linear calculation procedures. We tested the computer simulation on the basis of measurements with a liquid crystal.

8984
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INDUSTRIAL R AND D IN TELECOMMUNICATIONS

Budapest HIRADASTECHNIKA in Hungarian No 12, 1983 pp 555-561

[Article by Dr Gyula Tofalvi, Telecommunications Research Institute: "Domestic Industrial Research and Development in New Trends of Telecommunications and Teleinformatics services," a talk given at the 2 May 1983 scientific session of the Hungarian Academy of Sciences]

[Author's Summary] Our experts are conducting broad research and development in the area of new telecommunications and teleinformatics services. Because of space limitations the author can describe only parts of the extensive work, but it can be seen from this that domestic research and development are taking place in the most modern trends.

Special treatment is given to work connected with rural and suburban telephone service, digital signal transmission, optical telecommunications and microwave transmission.

The development of on-board and earth circuits and equipment connected with space telecommunications is only mentioned but it is expected that a detailed report on this will appear in a later article.

8984
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NEW PROCEDURES FOR COMMUNICATIONS SERVICE TO SPARSELY POPULATED AREAS

Budapest HIRADASTECHNIKA in Hungarian No 12, 1983 pp 562-566

[Article by Dr Gyorgy Lajtha, Postal Experimental Institute, and Dr Pal Ferenzy and Dr Sandor Csibi, Signal Technology Electronics Institute of the Budapest Technical University: "New Procedures for Communications Service to Sparsely Populated Areas," a talk given at the 2 May 1983 scientific session of the Hungarian Academy of Sciences]

[Authors' Summary] In their article the authors analyse in detail how the favorable economic, cultural, security and social effects of communications can be realized for the populace of scattered settlements. In the course of their analysis they examine possible solutions for this question of extraordinary significance in our homeland.

8984
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INFORMATION THEORY PROBLEMS OF COMMUNICATIONS NETWORKS

Budapest HIRADASTECHNIKA in Hungarian No 12, 1983 pp 567-570

[Article by Dr Imre Csiszar, Mathematics Research Institute of the Hungarian Academy of Sciences: "Information Theory Problems of Communications Networks," a talk given at the 2 May 1983 scientific session of the Hungarian Academy of Sciences]

[Author's Summary] Starting from the model of Shannon developed for single direction information transmission on a single channel, the author gives some insight into research being done in the area of multi-user systems. One of the central questions of his analysis is the capacity of the channels, their capacity range. In the course of his analysis he examines point-multi point systems also.

8984
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RELIABILITY OF DIGITAL EQUIPMENT

Budapest FINOMMECHANIKA, MIKROTECHNIKA in Hungarian No 11, 1983 pp 336-337

[Article by Istvan Hadrevi: "Concerning the Reliability of Digital Equipment"]

[Author's Summary] The article offers an introduction to the theme of reliability as it arises in designing digital equipment. As an example it shows how to evaluate the conditions provided by the reliability of digital equipment.

8984
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HIGH PRECISION MEASUREMENT OF ELECTROCHEMICAL MEASURING CELLS

Budapest MERES ES AUTOMATIKA in Hungarian No 12, 1983 pp 448-450

[Article by Balazs Laban, Radelkis Cooperative, Budapest: "High Precision Measurement of Electrochemical Measuring Cells"]

[Author's Summary] Modern electrochemical instruments must provide results with ever greater resolution. The great noise arising when measuring the signal provided by potentiometer measuring cells should be suppressed to the greatest extent in the first, input stage. By remodeling the grounding system and the input stage we succeeded in decreasing the effective value of the noise by nearly 40 dB.

8984
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AUTOMATING BRAZING IN A PROTECTIVE ATMOSPHERE FURNACE

Budapest FINOMMECHANIKA, MIKROTECHNIKA in Hungarian No 11, 1983 pp 338-339

[Article by Dr Rezso Nemenyi: "Automating Brazing in a Protective Atmosphere Furnace"]

[Author's Summary] For a long time brazing was done by hand. The development of electronics, precision engineering and signal technology made necessary the mechanization of the process. Modern brazing is done in a furnace, in a protective atmosphere. The most modern trend is vacuum brazing.

8984
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THERMAL EFFICIENCY OF ELECTRON AND LASER BEAM WELDING

Budapest FINOMMECHANIKA, MIKROTECHNIKA in Hungarian No 11, 1983 pp 325-328

[Article by Naderi Habib and Jeno Sashalmi, Machine Industry Technological Institute, Budapest: "Thermal Efficiency of Electron (and Laser) Beam Welding"]

[Authors' Summary] The basis for a study of a large part of the processes accompanying welding (e.g., structural changes, cracking, stress and deformation state, etc.) is a knowledge of the thermal process of the welding. But this knowledge is only approximate if we do not know the thermal efficiency of the heat transfer. The thermal efficiency of electron and laser welding has not yet been defined unambiguously because it is the combined function of very many physical factors. The article contains an experimental-computational procedure to approximate a solution of the task.

8984
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LASER DIODES IN OPTICAL COMMUNICATION

Budapest HIRADASTECHNIKA in Hungarian No 11, 1983 pp 509-516

[Article by Dr Istvan Habermajer, of the Electronic Devices Faculty of the Budapest Technical University: "Laser Diodes in Optical Communication"]

[Author's Summary] The first part of the article describes the fundamental physical processes taking place in semiconductor lasers. The second part offers a review of the development of the design of GaAs and GaAlAs based laser diodes. In the third part it summarizes applications areas for some laser diode types in optical communication.

8984
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HISTORY OF ELECTRONIC DEVICES FACULTY OF BUDAPEST TECHNICAL UNIVERSITY

Budapest HIRADASTECHNIKA in Hungarian No 11, 1983 pp 482-488

[Article by Eva Kanizsay-Karg (Mrs Sabo) and Dr Peter Gartner, of the Electronic Devices Faculty of the Budapest Technical University: "From Oxide Cathode to Silicon Dioxide, 25 Years of a Faculty"]

[Authors' Summary] The article describes the chief areas and prospects of the educational and research activity of the Electronic Devices Faculty, celebrating its 25th anniversary. It discusses timely tasks and the future of microelectronics education, briefly describing the efforts made in the interest of this goal at the Electrical Engineering School of the Budapest Technical University and the organization of a new department, the Microelectronics and Technology Department.

8984
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MICROELECTRONICS EDUCATION, RESEARCH BY ELECTRONIC DEVICES FACULTY

Budapest HIRADASTECHNIKA in Hungarian No 11, 1983 pp 489-491

[Article by Dr Kalman Tarnay, faculty leader, Electronic Devices Faculty, Budapest Technical University: "The Role of the Electronic Devices Faculty in Microelectronics Education and Research"]

[Author's Summary] While the generations have replaced one another--as on a revolving stage--in the area of electronic devices, one faculty--without large material resources--has kept pace and developed, defying the always existing conservatism which urged respect for tradition. It has renewed the study materials each year, even illegally, and won international recognition for itself.

8984
CSO: 2502/39

CONDUCTION IN THICK FILMS

Budapest HIRADASTECHNIKA in Hungarian No 11, 1983 pp 492-498

[Article by Dr Andras Ambrozy, of the Electronic Technology Faculty of the Budapest Technical University: "Conduction in Thick Films"]

[Author's Summary] The structure of thick film resistors is complicated, consisting of conducting metal oxide particles embedded in glass. The classical conduction theories cannot be applied to such structures. Acquiring more precise information requires a study of temperature factors, thermoelectric voltage, Hall voltage, gauge factor and incidental noise. The article deals especially with noise studies.

8984
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PRACTICAL EDUCATION IN TECHNOLOGY OF INTEGRATED CIRCUITS

Budapest HIRADASTECHNIKA in Hungarian No 11, 1983 pp 499-503

[Article by Veronika Horvath (Mrs Timar), Jozsef Harsanyi and Dr Janos Mizsei, of the Electronic Devices Faculty of the Budapest Technical University: "Practical Education in the Technology of Integrated Circuits at the Electronic Devices Faculty of the Budapest Technical University"]

[Authors' Summary] The article describes a 25-hour laboratory exercise in semiconductor technology and the so-called "independent laboratory tasks" taking place in the laboratory. On the basis of our experiences we analyze the need for laboratory training and the pedagogical possibilities involved therein.

8984
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CELL LIBRARY MANAGEMENT PROGRAM FOR MICROELECTRONIC DESIGN PURPOSES

Budapest HIRADASTECHNIKA in Hungarian No 11, 1983 pp 521-526

[Article by Dr Vladimir Szekely, Pal Baji, Dr Marta Rencz (Mrs Kerecsen), Ilona Konya and Dr Ferenc Masszi, of the Electronic Devices Faculty of the Budapest Technical University: "CELLIB--A Cell Library Management Program for Microelectronic Design Purposes"]

[Authors' Summary] The cell library management program described in the article supports the designing of cell-based LSI integrated circuits. It makes it possible to store in the cell library not only the layout description of the cells but also the outline diagram, the circuit and logic description and the symbolic circuit and logic diagrams. The program creates a direct link between the cell library data and the layout design, circuit simulation and logical simulation programs.

8984
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MEASUREMENT TECHNOLOGY REQUIREMENTS FOR LSI CIRCUITS

Budapest MERES ES AUTOMATIKA in Hungarian No 12, 1983 pp 458-461

[Article by Dr Istvan Kormos and Dr Zoltan Szamoskozi, Microelectronics Enterprise: "Measurement Technology Requirements for LSI Circuits, Part II"]

[Authors' Summary] The first part of the article described the characteristics of the most important LSI [Large Scale Integration] devices. The second part summarizes the measurement technology requirements deriving from these characteristics.

It examines the meaning, from the measurement technology viewpoint, of such parameters as number of leads, speed, timing, power voltage and current, output voltage and leakage current.

In defining the requirements special mention is made of differing unique characteristics connected with memory measurement systems and general purpose LSI measurement automats.

8984
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ECONOMICAL DESIGN OF ELECTRONIC CIRCUITS AND TOLERANCE THEORY

Budapest HIRADASTECHNIKA in Hungarian No 12, 1983 pp 575-578

[Article by Dr Karoly Geher, Signal Technology Electronics Institute of the Budapest Technical University: "Economical Design of Electronic Circuits and the Tolerance Theory," a talk given at the 2 May 1983 scientific session of the Hungarian Academy of Sciences]

[Author's Summary] The newer methods for designing electronic circuits make possible not only a determination of the manufacturing yield but also the calculation of new nominal element values and tolerances. We call the design method tolerance optimization or centralization of tolerance. The development of these procedures, significant from the viewpoint of cost effectiveness, is possible on the basis of a further development of tolerance theory. The author describes the development of design concepts on the basis of optimal yield. He refers to algorithms and computer programs developed in the Signal Technology Electronics Institute of Budapest Technical University. The methods are based on Monte Carlo simulation and optimization procedures. The programs pertaining to LC filters and active RC filters are used in industry as well as in education. With their aid one can increase the manufacturing yield and/or the value of permitted tolerances.

8984
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SAFETY OF TORCH WELDING AND TORCH CUTTING

Budapest FINOMMECHANIKA, MIKROTECHNIKA in Hungarian No 11, 1983 pp 329-335

[Article by P. L. Lonngren, AGA Welding AB, Malmo, Sweden: "Safety of Torch Welding and Torch Cutting, and Selecting Safety Elements"]

[Author's Summary] The article deals with the dangers of torch welding and torch cutting. It describes international prescriptions and tells how accidents can be prevented with safety equipment.

8984
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TECHNOLOGICAL MODELING OF MULTILAYER STRUCTURES

Budapest HIRADASTECHNIKA in Hungarian No 11, 1983 pp 504-508

[Article by Dr Kalman Tarnay and Dr Ferenc Masszi, of the Electronic Devices Faculty of the Budapest Technical University, and Dr Gyozo Drozdy, of the Microelectronics Research Institute of the Central Physics Research Institute of the Hungarian Academy of Sciences: "Technological Modeling of Multilayer Structures"]

[Authors' Summary] The article describes the most recent achievements in a further development of the STEP [Silicon Technology Evaluation Program] semiconductor technological simulation program system. The program now models impurity transport more complicated than the Si/SiO_2 structure, for example that taking place in multilayer structures containing polysilicon and silicon nitride. To do this required an extension of the modeling methods known from the literature for multilayer structures with several boundary surfaces and for oxidation and nitridation processes. The article describes a new algorithm developed for the solution of the problem which, in contrast to what has been known thus far, provides convergence of the solution even with boundary surfaces which shift in time in the case of multilayer structures.

8984
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INVESTIGATION OF MISS, MIST DEVICES

Budapest HIRADASTECHNIKA in Hungarian No 11, 1983 pp 517-520

[Article by Dr Imre Zolomy, of the Electronic Devices Faculty of the Budapest Technical University, and Armando Adan, of the Integrated Circuits Institute of the Havana Technical University: "Investigation of MISS and MIST Devices"]

[Authors' Summary] The creation of MISS and MIST devices with a p^+-n-i-m (p^+, n type semiconductor, tunnel oxide, metal) structure and two impedence states and a study of their physical functioning resulted in the discovery of new principles and phenomena. These included the transient processes of the devices under various external circuit conditions and various charge storage effects in the case of both two-terminal MISS and three-terminal MIST. The switching process can be influenced with the aid of light also. The static theory of MISS was further developed also. The new theory also takes into consideration a number of secondary effects and better describes phenomena which can be experienced in practice.

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